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WARTIME CHANGES IN THE PATTERNS OF UNITED STATES COAL PRODUCTION

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WORLD WAR II made unprecedented demands upon the United States coal supply. As a result the nation's production in 1944 reached an all-time high which may never again be equalled, and the average production for 1944 and 1945 was nearly 50 per cent greater than the average for 1937 and 1938, the two years immediately preceding the war. How did the country's coal-production patterns change under the stresses of war? Why did some coal-producing areas gain in relative importance and others decline? Did these changes result from the operation of continuing forces or are they temporary wartime phenomena?

This paper makes use of pattern-change maps and of centrography in attacking the problems outlined, and the attempt is made to analyze and evaluate the changes that occurred.

BASIC DATA FOR THE STUDY

It was decided to base the study on a comparison of the average coal production for 1937 and 1938, the last two years essentially unaffected by the war, with an average for 1944 and 1945, the two years that seemed best to represent production at the peak of the war effort. Coal production was defined as including not only bituminous coal, but also anthracite and lignite.

The first step was the collection of production statistics by counties for each of the four years involved.[1] Use of averages for 1937 and 1938 and for 1944 and 1945 was decided upon rather than comparison of a single war year with a single prewar

[1] For a discussion of the problems associated with assembling complete county coal production data covering the Appalachian Plateaus for a single year, 1939, see Murphy, R. E. and Spittal, H. E.: "A New Production Map of the Appalachian Bituminous Coal Region," *Annals Assn. of Amer. Geogs.*, Vol. 34, 1944, pp. 164–172. The difficulties there mentioned were multiplied in the present instance since the entire country was being covered and since production for each of four years was needed.

year since two-year averages avoid to some degree the geographic irregularities of a single year's production. These averages, whether on a county, state, or field level, formed the basis for all further work in the study.

A PATTERN-CHANGE MAP ON A COUNTY BASIS

The use of a pattern-change map based on county production data focuses attention directly on the counties that have changed most in relative importance as producers (Fig. 1).[2] There are, it will be noted, a number of counties throughout the country that gained in relative importance. Their rate of increase was greater than the United States average rate of increase. On the other hand a number of counties lost in relative importance. In some instances this loss was an absolute one, but more often these counties gained in production in response to the stimulus of wartime demand but did not keep up with the general rate of gain of the nation as a whole. And there are many counties that neither gained nor lost significantly in relative importance. Most of these are minor producers, but a few of the country's really important coal counties are in this category. Fayette County, Pa., for example, though a long-time large producer gained in production at about the same rate as the country as a whole.

A complete and accurate interpretation of the relative gains and relative losses throughout the country would form an interesting chapter in the history of the nation's coal-mining industry. Some of the highlights of this chapter will be pointed out here.[3]

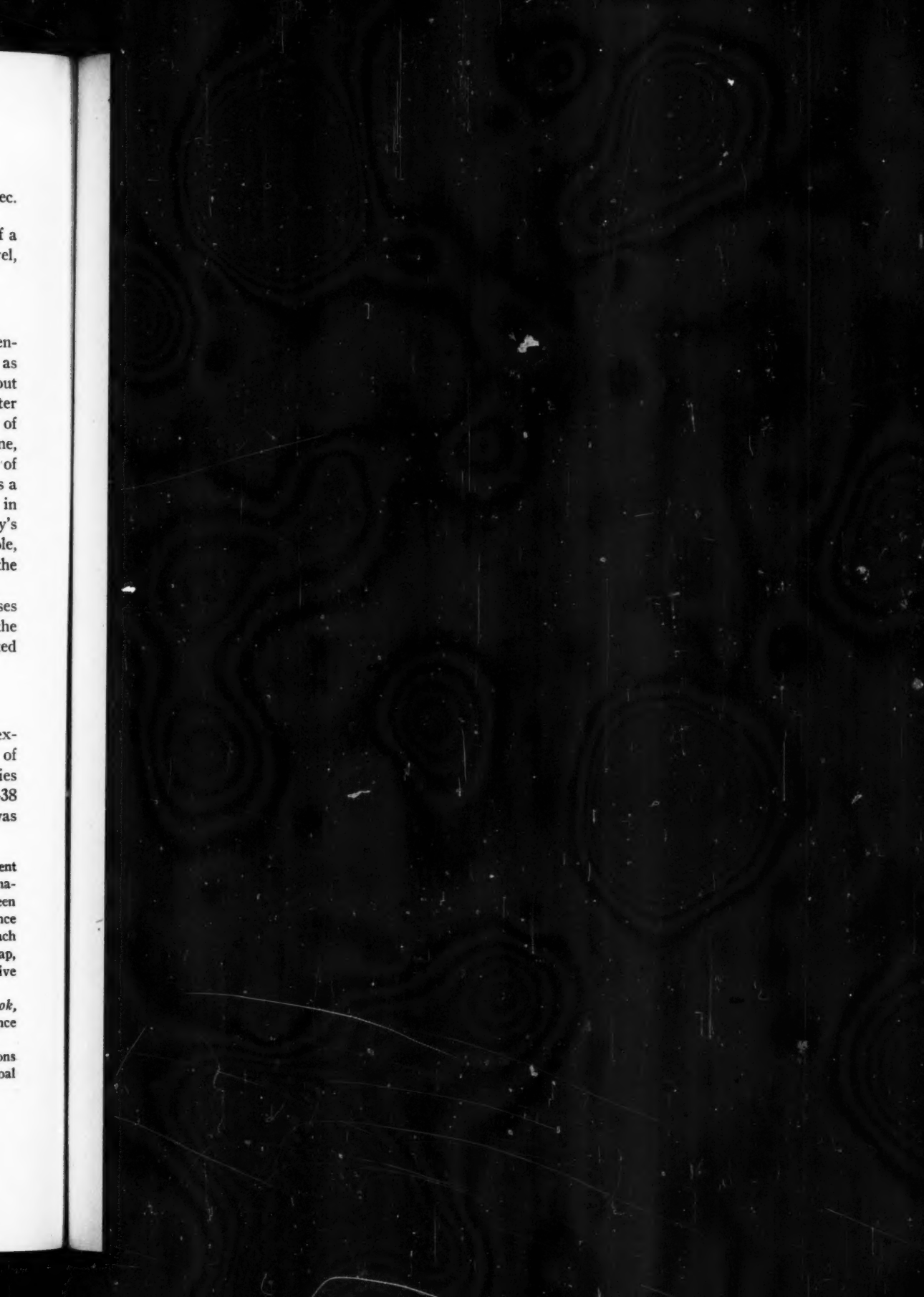
COUNTIES OF RELATIVE GAIN

No single explanation can account for the increases in relative importance experienced by certain counties throughout the country. These counties were of course either ones that had substantial coal seams yet to be developed or else counties where, for one reason or another, mines were not worked to capacity in the 1937–38 period. Certainly the most common explanation for marked relative increases was the growth of strip mining in some counties.[4]

[2] In the calculations on which the map is based, the first step was to determine the per cent of the country's 1937–38 coal production contributed by each county. Then a similar determination was made of the per cent contribution of each county in 1944–45, and differences between 1944–45 and 1937–38 contributions were calculated. It should be emphasized that the difference between the two numbers (one for 1944–45 and one for 1937–38) that thus results for each county is not a percentage difference but a difference in the per cent contribution. On the map, proportional circles are used to focus attention upon counties that changed most in relative importance.

[3] The explanations of gains and losses are based upon information in the *Minerals Yearbook*, on discussions and correspondence with U. S. Bureau of Mines officials, and on correspondence with various state departments of mines, state geological surveys, etc.

[4] Strip mining, which is impossible in some counties but favored by the physical conditions of others, increased rapidly during World War II. It accounted for 8 per cent of the coal mined in the United States in 1937–38 and 17½ per cent of that mined in 1944–45.



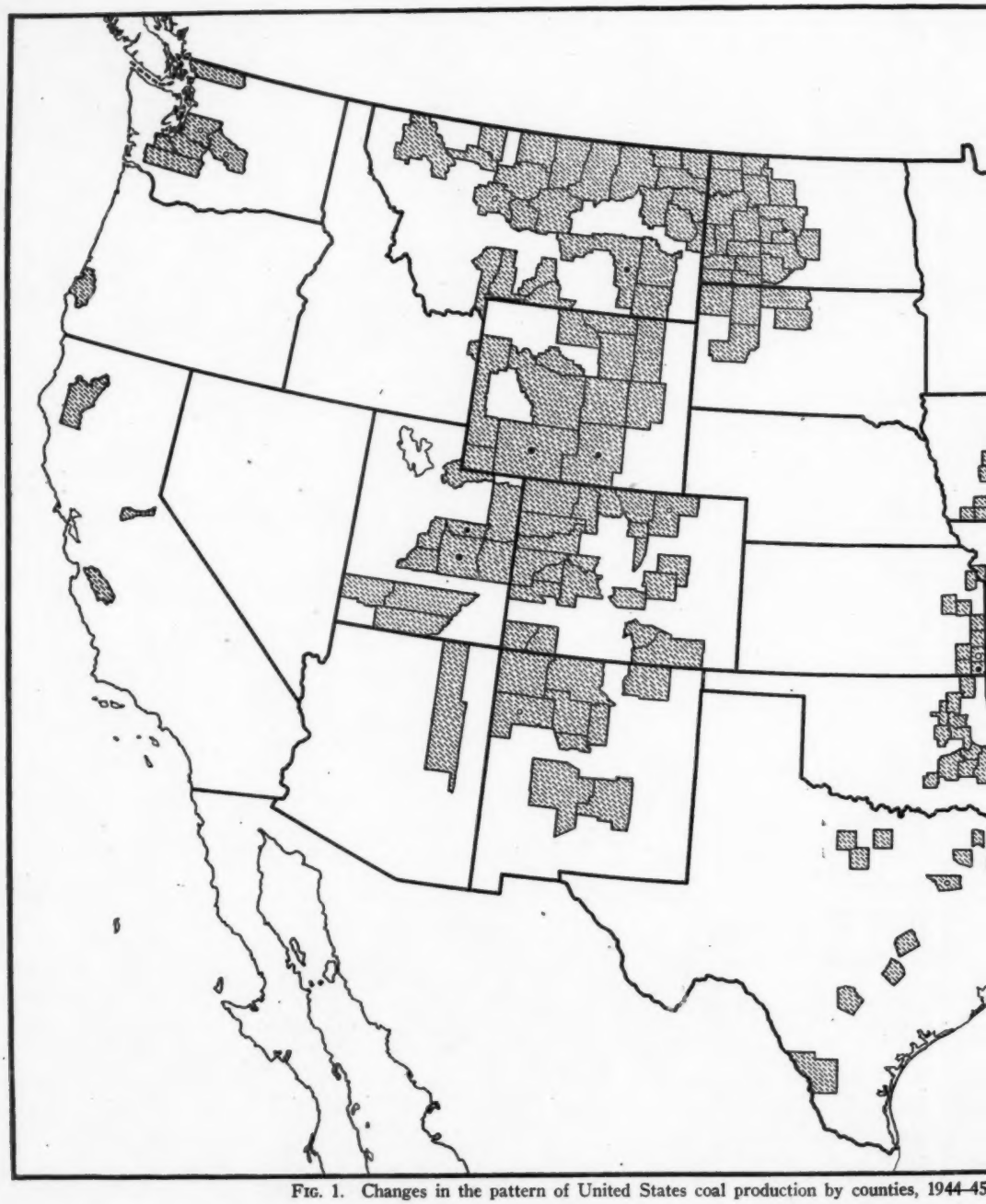
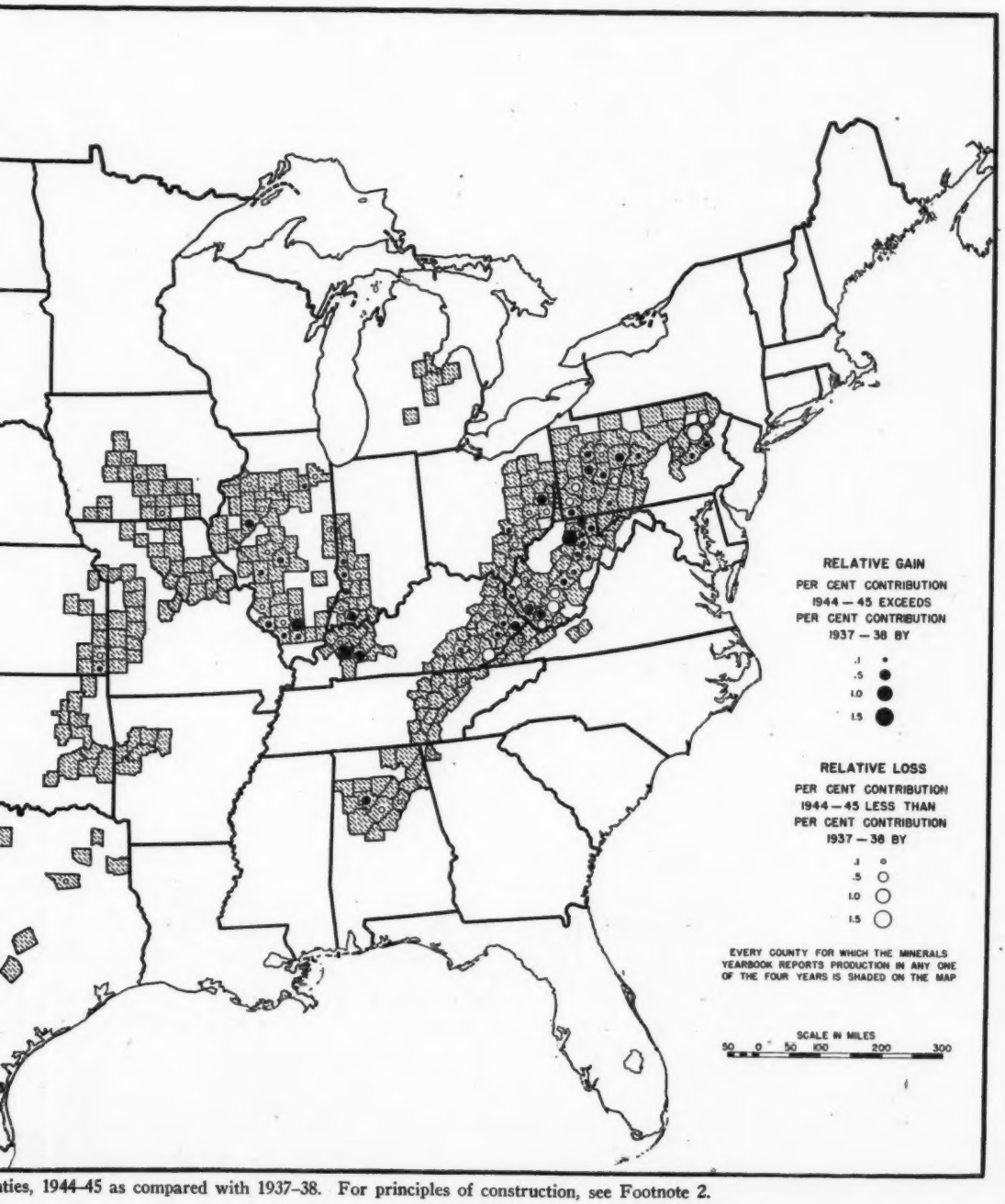


FIG. 1. Changes in the pattern of United States coal production by counties, 1944–45



ties, 1944–45 as compared with 1937–38. For principles of construction, see Footnote 2.

Several other factors help to explain the relative gains of some of the counties. Current market demands were greater for some types of coal than for others and thus certain counties were favored. There was also the factor of accessibility. During the war there was a tendency to produce coal in greatest quantity where it was most needed regardless of cost. Official regulations also entered into the picture. The federal government placed certain restraints upon the normal movements of coal from one locality to another which meant, in some instances, that coal had to be produced locally where it would ordinarily have been brought in from another region. Labor troubles do not affect all regions in similar degree and therefore were undoubtedly at least a minor factor in explaining some of the increases in relative importance. And there were instances of counties with increasing mechanization of mines where the mechanization did not bear full fruit until the 1944–45 period.

Some of these generalizations are readily substantiated by a study of the counties that showed the greatest relative gains during the period under consideration (Fig. 1). Harrison County in northern West Virginia, for example, in a general area of good coal and of large wartime demand, experienced a greater relative gain than any other county in the United States, producing 0.805 per cent of the nation's total in 1937–38 and 1.97 per cent in 1944–45. In the 1937–38 period no coal was reported as strip mined in the county; in 1944–45, 54 per cent of the total production resulted from stripping, and Harrison County produced considerably more coal by strip mining than any other county in the United States.

In western Kentucky, Hopkins and Muhlenberg counties stand out as having marked increases in relative importance. They were also by far the leading counties in Kentucky in stripping operations in 1944–45, approximately two-thirds of Hopkins County's increase resulting directly from increased use of this mining method. In Illinois, Fulton County in the west, which increased its strip production of coal threefold, is one of the two counties showing greatest relative gains. On the other hand, the Illinois county of greatest increase, Franklin, is not an area of coal stripping. Instead, its increase is attributed chiefly to an increased degree of mechanization of the mines.

The effect of stripping operations appears in many other cases as well. Thus, the greatest relative increase in Indiana was in Warrick County, whose tonnage of stripped coal was three times as great in 1944–45 as in 1937–38. In Ohio, Harrison County, with considerably the largest increase in that state, was also by far the leading stripping county and increased its stripped tonnage from an annual average of 383,000 in 1937–38 to one of more than 4 million in 1944–45. In Alabama, Walker County owed at least half of its relative gain to an increase in strip tonnage.

The other counties of relative gain had various combinations of strip mining and underground mining. In southern West Virginia and eastern Kentucky some counties where coal mining had been relatively undeveloped gained during the war even without the possibility of much coal stripping. In northwest-central Pennsylvania the story seems to have been one of increased stripping together with the reopening of mines that were idle during 1937–38. Relative increases in Carbon and

Schuylkill counties in the Pennsylvania Anthracite Region were due chiefly to increased stripping.

Although the fields of western United States are not very important factors in the overall picture of the country's coal production yet the largest producing counties of both Utah and Wyoming gained in relative importance. They had not yet been fully developed and so were able to expand production to meet local wartime demands (e.g., in the newly developed steel industry of Utah) and the expanded requirements of West-coast markets.

COUNTIES OF RELATIVE LOSS

The counties of greatest relative loss included a number of the country's largest producers. Probably the chief basis for decline was that in many of the more important producing counties coal mining was already fully developed and production had been near its peak for a number of years. These counties could not expand in response to wartime demands as could certain others that had large undeveloped resources or that had had idle mines in the 1937–38 period. In some of the counties strip mining was impossible; in others though important it did not fully offset the inability to expand underground production.

The greatest relative loss was sustained by Luzerne County in northeastern Pennsylvania; its neighbor, Lackawanna County, also suffered a notable relative loss. Actually, Luzerne County averaged about 21 million tons of anthracite in 1937–38 and 22 million tons in 1944–45. But this slight absolute gain was at a much lower rate than that of the United States as a whole. Luzerne County's production amounted to 4.76 per cent of the national total in 1937–38 but only 3.42 per cent in 1944–45.

The relative decline of the northern counties of the Anthracite Region cannot be attributed to a lack of market. Anthracite, though not primarily an industrial fuel, was much in demand during the war years partly because of the great industrial and war requirements for some of its competitors. The chief basis for the relative losses of Luzerne and Lackawanna counties was the fact that these counties were already mining about to capacity and had neither the available sites nor the man power to expand. The coal seams in these northern anthracite counties are too nearly flat-lying to permit stripping along the outcrops as is possible in Schuylkill and Carbon counties to the south. Moreover, it has long been realized that the greatest remaining anthracite resources lie in the southern part of the Anthracite Region, and it is to be expected that relative losses will be greater in the northern counties.[5]

[5] For a discussion of intraregional contrasts in mining conditions and in remaining anthracite reserves see pages 342–344 in Murphy, Raymond E. and Murphy, Marion F.: "Anthracite Region of Pennsylvania," *Econ. Geog.*, Vol. 14, 1938, pp. 338–348. Luzerne and Lackawanna counties contain most of the Northern field, and the greater portion of the Eastern Middle field is in Luzerne County. Schuylkill and Carbon counties contain most of the Western Middle field and the Southern field.

Large relative declines were experienced also by several southern West Virginia counties and by Harlan County, Kentucky. These are in the general category of counties that had already reached their peaks of production. Moreover, physical conditions are not favorable to the development of much strip mining in these counties. Though they increased in production they did so at a lesser rate than did the United States as a whole.

Several of the great coal counties of western Pennsylvania also declined relatively. Washington, Allegheny, and Cambria counties were the most striking in this regard. Here, again, coal mining was near capacity in 1937–38 and hence, in spite of a tremendous increase in stripping operations, production gains could not keep up to the country's average.

PATTERN-CHANGE MAPS BY FIELDS AND BY STATES

The information shown in detail in Figure 1 can be summed up by fields on a second pattern-change map (Fig. 2-A). The most notable features of this map are the great relative decrease of the Pennsylvania Anthracite Region and the even greater relative increase of the Eastern Interior Region.

The relative decline of the Pennsylvania Anthracite Region is not surprising in view of the trend of anthracite production in recent years (Fig. 3). The production curve has taken a general downward course since World War I, and it is hardly to be expected in such a compact area that this trend could be reversed sufficiently for the region to keep pace with the general wartime increase. The relative decline, therefore, can be attributed chiefly to a lack of capacity. The region had neither the installations nor manpower to hold its own in the period of rapid production increase.

The great relative increase of the Eastern Interior Region seems to have been due in considerable part to a special wartime market situation. The normal movement of coal from southern West Virginia and eastern Kentucky to Midwestern markets was greatly reduced by a government order forbidding shipment of coking coal to the Midwest except for coking purposes.[6] This put unprecedented demands on the coal resources of the Eastern Interior Region.

The great relative increase of the Eastern Interior Region resulted in changes, too, on a state basis (Fig. 2-B). Kentucky, as a result of the operations in its western counties, gained in relative importance more than any other state. It produced 10.7 per cent of the national total in 1944–45 as compared with only 9.6 per cent in 1937–38. Illinois' increase in relative importance was almost as great, and Indiana, too, showed a substantial increase.

[6] For normal movements of coal to its markets see Voskuil, Walter H.: "Bituminous Coal Movements in the United States," *Geogr. Rev.*, Vol. 32, 1942, pp. 117–127. See also, *The Economics of Coal Traffic Flow*, Senate Document No. 82, 1945. Regarding the effects of the government restraint see Voskuil, Walter H. and Stevens, Douglas F.: *Illinois Mineral Industry in 1944*, Report of Investigations No. 109, Illinois State Geological Survey, 1945, pp. 19 and 21.

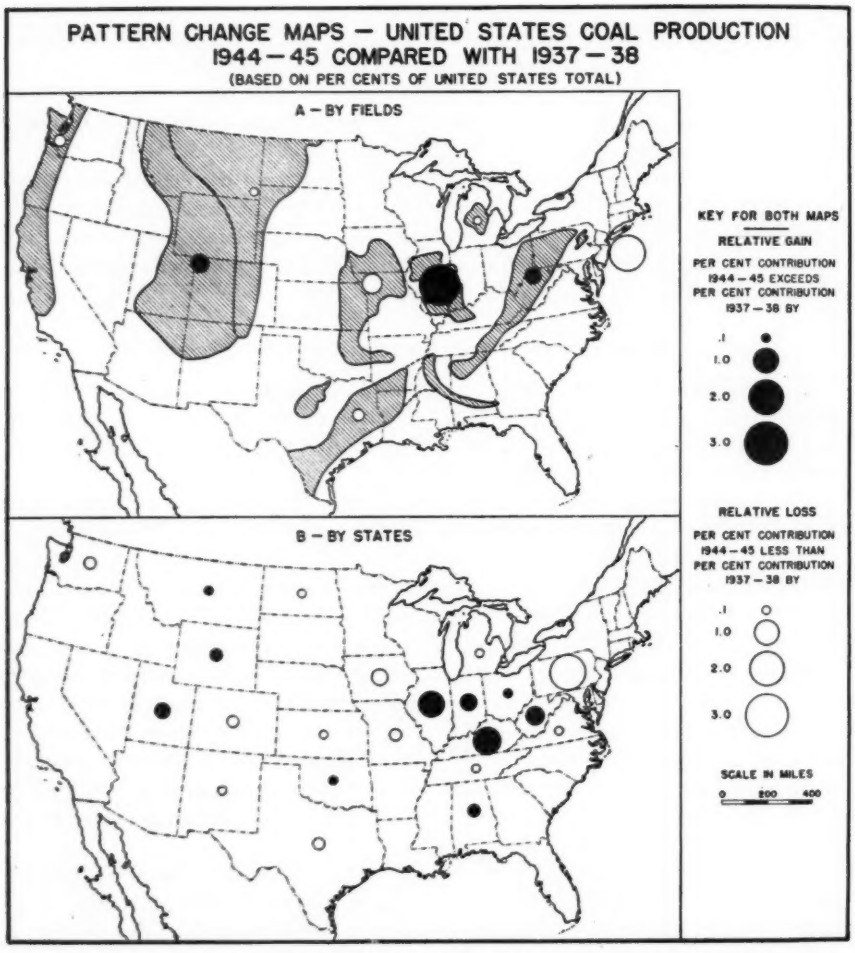


FIG. 2. Changes in the pattern of United States coal production by fields and by states, 1944–45, as compared with 1937–38. For principles of construction, see footnote number 2.

Other changes in the relative importance of fields are less striking (Fig. 2-A). The net effect of the gains and losses in the several counties of the Appalachian Bituminous Coal Region was a moderate gain in relative importance for the region as a whole. Some increase was to be expected in view of the high quality of Appalachian bituminous coals and the superior location of the region with respect to coal-using industries.

A further breakdown of the Appalachian Bituminous Coal Region, traditional in the coal business, may be made into the "Northern Fields" (Pennsylvania, Ohio, Maryland, and northern West Virginia) and the "Southern Fields" (southern West Virginia, eastern Kentucky, Virginia, and northern Tennessee).[7] The Northern Fields increased their proportion from 32.2 per cent of the nation's coal in 1937–38 to 34.3 per cent in 1944–45. The Southern Fields, on the other hand, declined in relative importance from 29.6 per cent in 1937–38 to 27.6 per cent in 1944–45. This reversal of a long-time movement of the coal industry toward the south in the Appalachian Bituminous Coal Region was commented on in an earlier paper.[8] It may be attributed in considerable part to the great wartime demand for coal in the factories of the Northern Fields, and in part to the more favorable conditions for strip mining in the north that have made possible such developments as that in Harrison County, West Virginia.[9]

As a bituminous coal producer, West Virginia, leading state before World War II, gained still further in relative importance as compared with its rival, Pennsylvania. Of course Pennsylvania's great relative loss as a coal-producing state was due primarily to the relative decline of anthracite production, but considering bituminous coal alone Pennsylvania lost ground. In 1937–38 Pennsylvania produced 21.2 per cent of the nation's bituminous coal and West Virginia, 23.7 per cent; in 1944–45 Pennsylvania's percentage was essentially unchanged whereas West Virginia's proportion had increased to 24.2 per cent. It may be assumed that West Virginia's increase was due to developments in the northern part of the state. Harrison County, of course, accounted for much of it.

The decline in the Western Region of the Interior Province is a result of the operation of several factors. On the whole, however, the coal is not of high quality and since the region lies some distance from the areas of greatest industrial development there was not much wartime pressure for its production. Iowa, with the greatest loss in the region, has relatively poor coal, difficult to mine. In Missouri most of the coal is produced by stripping, but much of the best strip coal had been

[7] In this trade classification the coal fields in Alabama, southern Tennessee, and Georgia are omitted since they do not in general compete for the same markets as the other two groups of fields in the Appalachian Bituminous Coal Region.

[8] Murphy, R. E. and Spittal, H. E.: "Movements of the Center of Coal Mining in the Appalachian Plateaus," *Geogr. Rev.*, Vol. 35, 1945, pp. 624–633, see especially p. 630.

[9] An outstanding development of the war period was a shift of the lead in coal stripping from Illinois and Indiana to western Pennsylvania, northern West Virginia, and Ohio. The production of bituminous coal by stripping increased in Illinois and Indiana, and western Kentucky staged a major increase, but some of the greatest wartime gains occurred farther east. Illinois lost the lead in bituminous coal stripping to Pennsylvania in 1943 and the northern sections of the Appalachian Plateaus now strip nearly twice as much coal as Illinois and Indiana combined. This shift is all the more remarkable in view of the fact that much of the eastern strip coal must be taken from hillside outcrops in marked contrast to the uncovering of extensive shallow coal beds in the flat lands of the Middle West.

mined even before the war and there was little basis for large new developments being initiated. Moreover, several large producers in Missouri were moving operations during at least part of 1944–45 and hence for a portion of the period were out of production.

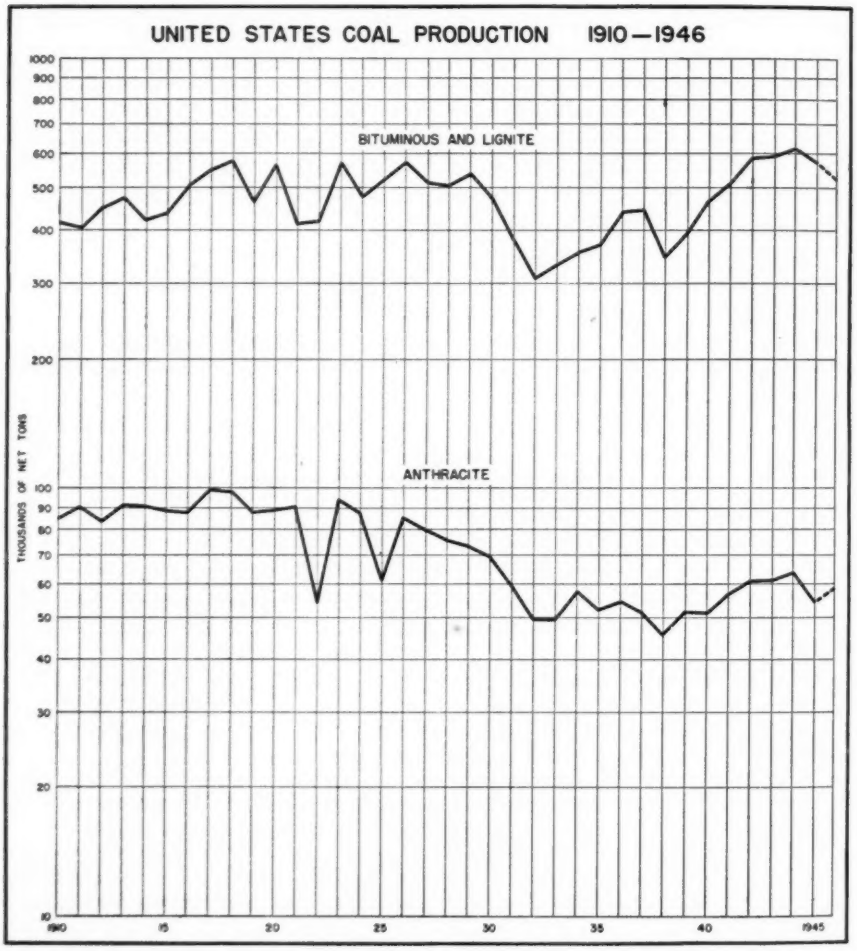


FIG. 3. Long-time trends in the production of bituminous coal and lignite as contrasted with anthracite. Anthracite production has shown a general downward trend for a number of years. Note that the production of bituminous coal and lignite increased at a much more rapid rate during World War II than did the production of anthracite.

The relative increase in the Rocky Mountain Province covers some interesting contrasts between states (Fig. 2-B). Thus, Colorado declined in relative importance. The steel industry of that state increased operations very little during the war. Moreover, natural gas from the Amarillo Field has been invading local markets for coal, and Colorado does not produce the type of coal that was in demand by the wartime, West-coast markets. Utah, on the other hand, profited by the development in that state of iron and steel mills using local coal, and both Utah and Wyoming increased their sales to West-coast markets. Hence both of these states gained in relative importance.

The declines in some other sections of the country are of interest, though of less importance in the national picture. (1) The production decrease in the Pacific Coast Province, absolute as well as relative, was in the state of Washington, the only one of the states in that province that is of any significance whatever as a coal producer. Here, California fuel oil and local hydroelectric power have been encroaching upon coal markets and so too have waste products from the lumber industry. Coal imports from the Mountain States compete seriously with the local coal which is lower in quality and more difficult to mine. The trend was hastened, moreover, by the effect of war industries competing with local coal mining for the labor supply. (2) The decline in the Gulf Province was, of course, in Texas. This decline, an actual decrease in tonnage, was little related to the war but represented, instead, the culmination of inroads of natural gas on the markets for lignite, an invasion that has been under way for some time. (3) The Northern Interior Region of Michigan though never more than a minor element in the country's coal production picture declined still further during the war years. Production in that state has been largely due to attempts to patronize local industry even though the coal is of very poor quality. During the war these uneconomic efforts declined and with them the state's coal tonnage. (4) The Northern Great Plains Province, which produces about half as much coal as the Rocky Mountain Province, lost ground relatively during the war. Unlike the situation in the three areas just discussed, there was actually an increase in production, but it was at a slower rate than the country's average. This is not surprising in view of the remote location of the region with respect to the more populous areas of the United States.

THE CENTER OF COAL PRODUCTION

Did the country's coal industry as a whole show any appreciable shift in location between 1937–38 and 1944–45? To answer this question the center of United States coal production was calculated for each of the two periods (Fig. 4).[10] Although

[10] The center calculations for 1937–38 and for 1944–45 are based on the county averages earlier described (cf. p. 1 of this article). The method of calculating such a center, which is really a center of gravity of production, is described in Murphy, R. E. and Spittal, H. E.: "Movements of the Center of Coal Mining in the Appalachian Plateaus," *Geogr. Rev.*, Vol. 35, 1945, Figure 1, p. 626.

FIG. 4. Centers of production of coal in the United States. The 1937–38 and 1944–45 centers were calculated by the author. The centers for 1934 and earlier are after Tryon, F. G., *The Changing Distribution of Resources*, in *Migration and Economic Opportunity: The Report of the Study of Population Redistribution*, by Carter Goodrich and others, Wharton School of Finance and Commerce, University of Pennsylvania, Philadelphia, 1936, Fig. 51, p. 252.

there was a measurable movement of the center the movement was surprisingly small, which suggests that wartime demands were met chiefly by pressure upon existing producing facilities. The geography of increased wartime production followed in general the pattern of prewar years but intensified this pattern.

The last previous calculation of the center of coal production that has come to the writer's attention is one for 1934 (Fig. 4).[11] This center is about 50 miles northeast of the 1937–38 center calculated in the present study. The inference is that the center of production had already moved toward the southwest between 1934 and 1937–38; in the 1937–38 to 1944–45 interval that direction of movement was continued.

[11] The several centers calculated by F. G. Tryon, Figure 4, are not exactly comparable to the centers calculated by the present writer since Tryon's original materials are not available and the transfer of the centers from his published map to the present map undoubtedly involved some error. Moreover, the methods used by Tryon in his calculations may have been slightly different from those of the writer. For the latter reason, the distance and direction between his 1934 center and the 1937–38 center are not considered to be as reliable as the other information shown on the map.

PERMANENCE OF WARTIME PATTERN CHANGES

It is immeasurably easier to analyze the pattern changes that took place in the 1937–38 to 1944–45 interval and to find reasonably satisfactory explanations for them than it is to judge the permanence of these changes. So many interrelated factors are involved that any statements regarding the future must be qualified and even then are extremely hazardous.

The pattern changes that have been described are of several classes or scales, and prospects of the permanence of these changes may be discussed accordingly. Most of the counties that had great relative increases during the war, even though they may decline in response to a diminished market or to regional declines, will continue for some years to be more important elements of the picture than they were in prewar years. Most of them had large, new stripping developments and stripping should not be regarded as just a wartime phenomenon. Better development of power shovels has made this a highly efficient method of mining coal. Though the country's bituminous coal production declined from 1944 to 1945, the tonnage obtained from stripping increased, and estimates for 1946 suggest that the proportion obtained from stripping has continued to increase. In fact, some of the greatest relative gains in the next few years will probably be made by counties with large postwar stripping developments.

It is likely that the several counties of great relative loss will regain some of their former importance since with the inevitable postwar decline in coal markets the large, fully-developed producers will again have the advantage over less efficient operations. On the other hand the rise of certain new counties during the war, especially through stripping developments, may make it increasingly difficult for the old, fully developed counties to hold their own. The relative loss in Luzerne and Lackawanna counties in the Anthracite Region of Pennsylvania is a result of long-continuing forces including declining coal resources in these counties. It does not seem probable that these counties will regain more than temporarily much of their lost ground.

Turning to changes on a field and state basis, there is considerable doubt whether the Eastern Interior Region can maintain its wartime relative position. Under peace conditions with restrictions on shipments removed the superiority of Appalachian bituminous coals should again assert itself. Within the Appalachian Bituminous Coal Region the relative rise of the Northern Fields as compared with the Southern Fields may be maintained for some years, due to more favorable conditions for stripping in the North. Eventually, though, the coal industry of the Appalachian Plateaus will probably resume its march southward since the center of the region's coal resources lies in that direction.[12]

The Anthracite Region can be expected to continue its long-time absolute decline, though a severe depression with a consequent restriction of markets for industrial

[12] Murphy and Spittal, *op. cit.*, pp. 630–631.

fuel might cause the region to enjoy a temporary relative gain. The record of 1946 shows still another possible basis for a temporary rise in the relative importance of the region (Fig. 3). In that year serious strikes resulted in a decline in the country's bituminous coal production whereas the Anthracite Region enjoyed a good year.

The forces resulting in the relative declines in Michigan, in Texas, in Washington, and in the Western Interior Region were such as to suggest that these areas will remain less important than they were before the war. The permanence of such increases as those of Utah and Wyoming would appear to depend upon the future of the war-born steel industry and on the question of whether or not the West continues to have substantially more manufacturing than before World War II.

At another level is the problem of the future movements of the center of coal production which in turn reflects the movements of the coal industry as a whole. In spite of a movement toward the east between 1929 and 1934 and a southward movement before that, the center appears to have moved in a general southwestwardly direction over the years (Fig. 4).[13] This is a direction that happens to be fairly consistent with the location of the country's center of reserves, determined as lying in south central Nebraska just a little north of the state line.[14] But, of course, the movement of the center of production has been a reflection of the industrial development of central United States rather than of the vast western coal resources.

It must be remembered that the western coals average low in rank and that the reserves of high-grade bituminous coal in the East are still very large. It would take a great development of western industries with correlated demands on the western coal fields or a considerable expansion of production in the interior coal regions to appreciably offset the huge eastern tonnage. Therefore, any considerable westward movement of the center for some years to come seems improbable. And, if the Eastern Interior Region is unable to sustain its wartime relative importance, as has been implied, then there may even be a slight eastward retreat of the center of production in the postwar period.

We are in a period of tremendous changes, some of which may greatly affect the patterns of coal production. No one is able to say with any assurance, for example, to what extent atomic energy may replace coal in the years to come. The present study does not attempt to go beyond the map of the immediate future.

[13] The slight eastward movement of the center of coal production from 1929 to 1934 has been explained as due chiefly to the fact that the anthracite industry declined somewhat less during the depression of the early 1930's than did the output of bituminous coal which was greatly affected by the decline of the heavy industries. See F. G. Tryon, *op. cit.*, footnote on p. 291.

[14] *Ibid.*, Fig. 55, p. 288, and p. 290.

LOCALIZING VEGETATION TERMS

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THE growing interest in biogeography makes it desirable to clarify the use of some terms whose indiscriminate handling has resulted in much confusion. In view of the very large and increasingly complicated vocabularies of most sciences, it is a great advantage for students of vegetation that four or five dozen terms have so far been adequate to describe the world's green garment. No doubt, more terms will find acceptance as the studies become more refined. But the terms that exist now and which are widely used by geographers do not convey the same meaning to every investigator. The confusion arising from this vague terminology has already led to publication of the paper "A Geographic System of Vegetation,"[1] in an attempt to permit a physiognomic description of vegetation anywhere on the globe in general but unambiguous terms. The Geographic System of Vegetation uses only universal terms consistent with its character.

But there are numerous vegetation terms which relate to one distinct region only: the localizing vegetation terms. They arose from popular use without any scientific connotation and some of them have experienced a considerable extension of their application. They imply a distinct vegetation type, one might say a vegetal personality. Of course, this does not mean that such types are entirely uniform throughout the area of their occurrence; considerable variations are common indeed. It is important that all localizing vegetation terms be used exclusively in their areas of origin. To use such names elsewhere is really feasible only when there is a genuine agreement in the physiognomy of the vegetation, and that is rare. Thus it is justified to extend the use of Tundra and Taiga to North America. In areas where no local terminology has been developed, the universally applicable expressions of the Geographic System of Vegetation should be used exclusively. To emphasize the areal affinities it is suggested that the localizing terms be capitalized whenever used in the sense of this paper, just as mountains, rivers, and deserts are capitalized, like the Alps, the Rhine, and the Sahara. The broader use of some terms is now generally accepted, though with varying justification. The extent of any of these vegetation forms varies from a very clearly outlined continuous area to an area of no distinct boundary and discontinuous territory.

[1] Küchler, A. W.: "A Geographic System of Vegetation," *Geographical Review*, Vol. XXXVII, No. 2, pp. 233–240.

In the following discussion the localizing vegetation terms are, as a matter of convenience, arranged by continents.

NORTH AMERICA

Chaparral (Spanish): The term refers above all to California but extends beyond the borders of that state into southern Oregon, Arizona, and northwestern Mexico. Some authors have attempted to extend the Chaparral to Colorado and Texas and even the Dakotas. But in these states the shrubs are deciduous while in California they are evergreen. Such a wide application of Chaparral is only possible at the expense of personality, and it would be difficult to prevent the use of this term for any shrubby vegetation anywhere on the globe. In order to maintain a distinct vegetal unit, it is imperative to limit the use of this term to evergreen shrubs. Another aspect is the definition of Chaparral with regard to the presence of trees. Often trees are entirely wanting. But frequently live oaks, pines, sycamores, and other genera occur, especially in canyons. One should not feel disturbed by the fact that sometimes the Chaparral almost takes on the appearance of a forest rather than a shrub formation. It is suggested here to use the term Chaparral for a broadleaf evergreen shrub formation, with or without trees, in the southwestern United States and northwestern Mexico.

Sage brush (English): This term takes one to the Great Basin, where the sage (*Artemisia tridentata*) dominates the scene as a broadleaf evergreen dwarf shrub formation. The Sage brush extends from the eastern foot of the Sierra Nevada and the Cascade Mountains to the Wasatch Mountains in central Utah, and from southern Idaho southward for about 1100 km (approximately to 37° n. lat. in Nevada). After the advent of white settlers, the sage spread considerably beyond the borders of this core area, especially in eastern Utah and in Wyoming. Freeman[2] emphasized that the Palouse may not be included here. *Artemisia* species occur elsewhere, too, as for instance in the coastal areas of California, but the true area of the Sage brush is the Great Basin. There is no particular problem involved in discussing the term Sage brush, except possibly that of areal extent. Throughout its area *Artemisia tridentata* dominates and where it does not, as in saline areas or in higher altitudes, the name Sage brush is no longer applied. These are islands in the sea of Sage, but not a part of it.

Prairie (French): When the French *coureurs de bois* penetrated the Great Lakes forests and emerged at their western border, they found a grassland which reminded them of the French meadows; they called it Prairie. From this transition

[2] Otis W. Freeman, during the discussion of this paper at the annual meeting of the Association of Pacific Coast Geographers, San Diego, California, June, 1947.

zone between forest and grassland the name Prairie spread to the Rocky Mountains, including the grasslands of the entire area from western Indiana to eastern Colorado and from central Alberta to Texas. One learned to speak of the Prairie States in this country and of the Prairie Provinces in Canada, and in common parlance the term Prairie continues to refer to this vast area.

The name as such implies nothing but grassland without any differentiation, and this is where it has come into conflict with scientific practice. It has been a practice in recent years among the students of vegetation in this country, to distinguish between grasslands according to the height the grass will reach at maturity. The term Prairie is then applied to the taller grasses while the shorter grasses are termed Steppe. Weaver and Clements,[3] especially, have done much to analyze and partition the Prairie, contributing to the confusion in terminology. Their excellent work suffers from the fact that it postulates general principles, which are then applied in an area not much exceeding the continental United States. A terminological conflict is avoided by ignoring the rest of the world. This manner of work is unacceptable to geographers.

A further complication arises from the fact that some authors use the term Prairie for any tall grass area anywhere, thus greatly extending the use of this term. On this basis, much of the Russian Steppes ought to be termed prairie! On the other hand, the Prairie as a region has become so well established in the minds of geographers and others, that in text books throughout the world it is just this central North American region to which the term Prairie is applied.[4] Therefore, it is here proposed to speak of tall grass when referring to a grassland in a subhumid region anywhere on the globe, and to reserve Prairie to the great grassland region in the heart of this continent, regardless of its local variations.

Muskeg (*Algonquian*): This word of Algonquian origin refers to the numerous swampy areas of varying size in the boreal forests of northern North America. It is one of the terms that had its origin in this hemisphere and from that point of view is especially interesting. Muskeg does not refer to a vegetation type that covers one continuous area, as in the case of the Prairie. Rather it implies a vegetation which is distinctly different physiognomically from the surrounding kind, due

[3] Weaver, J. E., and Clements, F. E.: *Plant Ecology*, New York, 1938, 516 ff.

[4] For instance, E. de Martonne: *Traité de Géographie Physique*, Vol. III, p. 1294, Paris, 1927, or Ed. Rübel: *Pflanzengesellschaften der Erde*, pp. 147 and 189, Bern, 1930. How well the regional extent of the Prairie is established in the minds of researchers is illustrated by J. E. Weaver: "North American Prairie," *American Scholar*, 13, 1944, p. 329. Weaver states here that the Prairie includes all grasslands in North America, as those of California, Arizona, Mexico, the Palouse, etc. But in his graphic descriptions of the Prairie and its seasonal changes he obviously refers only to the Prairie as understood in this paper; the great grassland of central North America between the eastern forests and the Rocky Mountains, to the exclusion of all other grasslands which in the beginning of his paper were listed as part of the Prairie.

to a waterlogged substratum. The descriptions of Muskegs by various authors such as Raup, Hills, Moss, Lewis, and others vary to a considerable degree, especially as some emphasize the absence of trees while others describe a fair variety of trees in what they refer to as Muskeg. It is well possible that all muskegs represent various stages in the conquest of lakes by vegetation; the muskeg will disappear when this conquest is complete and the soil no longer waterlogged. The Muskeg occurs anywhere within the Taiga and is definitely limited to the extent of that formation. Where the Taiga ends, the term Muskeg ceases to be applicable. Muskeg refers therefore to a distinct area, even though it occupies only a fraction of it. The intimate relation to the Taiga seems to warrant the use of the term Muskeg in Eurasia as well, although this has not been common practice so far.

SOUTH AMERICA

Llanos (Spanish): Ever since Von Humboldt travelled in northern South America, the Llanos have aroused the interest and curiosity of travellers. The Llanos extend from the Andes in the north to the Orinoco or slightly beyond, in the south, and from the dense forests of the Orinoco delta westward for about 1000 km into eastern Colombia. They consist of large grass-covered plains, over which trees, often palms, are thinly scattered. In addition there are dense galeria forests along the permanent streams and occasional formations of shrub which at times become quite extensive. The palm Savanna is nevertheless the most typical aspect of the Llanos. Sachs and Schimper[5] emphasize this physiognomic significance in contrast to Von Humboldt, who speaks of treeless plains. This implies that the Llanos are not physiognomically uniform. But the region is nevertheless a distinct one and the name Llanos has become inseparably linked with it, even though in Spanish literature, the term llanos is frequently used to denote plains, especially grassy plains, anywhere.

Páramo (Spanish): This is areally a very distinct term in as much as it refers to the vegetation above timberline in the Andes of Venezuela, Colombia, and Ecuador. It reaches upward to the snowline, if there be one, and is not dependent on the actual height of timberline above sea level. However, timberline does not seem to rise much above the 3000 m contour, which is surprisingly low. Broadleaf herbs and especially grasses characterize the Páramo, but in addition there are dwarf shrubs and highly peculiar plants of short thick trunks carrying a thick tuft of large hairy leaves. Although the vegetation of the Páramo is very specific, it is not unique. As Troll[6] has pointed out, far from the northern Andes, in higher latitudes and lower altitudes of the southern hemisphere, types of vegetation occur that resemble the Páramo vegeta-

[5] Schimper, A. F. W.: *Plant Geography*, Oxford, 1903, pp. 370 and 372.

[6] Troll, Carl: *Studien zur vergleichenden Geographie der Hochgebirge*, Bonn, 1941, pp. 94–95.

tion in a striking manner. Due to the altitudinal limitation of the Páramo, it does not consist of one continuous area but rather of smaller, isolated sections scattered over the entire region of the higher Andes of northern South America.

Puna (Quechua):[7] Reaching from north-central Peru into Bolivia, this grassland is limited to the plateaus of very high altitudes (above 4000 m) and the mountains that rise even higher. The upper limit of the Puna is between 4600 and 5100 m. The Puna is rather uniform but variations do occur, based largely on the availability of water. West and south are drier than north and east and porous volcanic ash tends to be very dry wherever it occurs. There are many herbaceous plants other than grasses in the Puna, also low-growing cacti. The tola shrub, less than ½ m high, occurs on dry volcanic soils. Puna is also used physiographically, and as such includes areas as far south as northwestern Argentina with its distinctly xerophytic vegetation. One must therefore beware of a confusion in the use of the term Puna.

Loma (Spanish):[8] A type of vegetation consisting primarily of annual herbaceous plants, few grasses and a considerable variety of bulbous and tuberous plants. It occurs on slopes of the central and southern Peruvian coast ranges from about 8° s. lat. southward and is limited to the windward or ocean-facing sides, or wherever much fog collects during several months. The strong seasonal variation in the physiognomy of the Loma is very characteristic in spite of the occasional presence of cacti or, along some streams, the appearance of shrubs and even low trees. Lichens may be so frequent that during the dry season the Loma seems to be no more than a lichen formation. The dependence on the presence of fogs and the annual character of most participating species permits the Loma to expand or contract its area considerably from year to year, according to the abundance of fog. It does not generally reach the seashore, and the more gently the land rises above sea level, the farther inland it makes its first appearance. The Loma is restricted to the proximity of the ocean and with increasing distance from the sea becomes more and more limited to higher altitudes, reaching to the very peaks of the coast ranges (usually less than 1000 m in elevation). The best development of the Loma coincides with the greatest abundance of fog, as on slopes most directly exposed to the winds from the sea, or in valleys that open only to the major wind direction, and which therefore catch and hold much fog.

[7] The discussion of the Puna is based on: Weberbauer, A.: *Die Pflanzenwelt der Peruanischen Anden*, Leipzig, 1911, pp. 192–227.

[8] The discussion of the Loma is based on: Weberbauer, *op. cit.*, pp. 134–49; and on information received on May 1, 1947, from Professor W. F. Jenks, The University of Rochester; and on personal observation.

Pampa (Quechua): The great grasslands around the Rio de la Plata resemble the Prairies of North America in more than one respect. Here again is one vast area, and here, too, physiognomic variations are considerable. But again the term ignores any differentiations and is broadly applied to the entire grassland that stretches from southern Brazil through Uruguay into the heart of Argentina. But the borders of the Pampa are very indefinite. The northern border stretches across Rio Grande do Sul westward into Corrientes. This border, a transition area with the forests to the north, takes on the appearance of parklands. In southern Corrientes and Entre Rios, there are enough trees and shrubs to alter the physiognomy of the Pampa considerably, but farther south, in the province of Buenos Aires, the trees vanish completely and the grasses reign supreme. The transition toward the western scrub begins within the province of Buenos Aires and grasses become increasingly scarce. The administrative unit "Territory of La Pampa" is therefore outside the limits of the vegetational region of the Pampa. Frenguelli's map[9] somewhat obscures the real extent of the Pampa. Many sections of Entre Rios and Corrientes have a typical palm savanna, while the rivers in Uruguay and southern Brazil are accompanied by vigorous galeria forests.

Caatinga (Tupi): This is another term which, like Puna and Muskeg, is indigenous to this hemisphere. Literally, it means light or white forest, referring to the light color of the trunks and branches of the shrubs and low trees when defoliated during the dry season. The Caatinga is the scrub forest *par excellence,* especially adapted to prolonged drought. Many species are thorny, some broadleaf trees are able to store water; nearly all are deciduous; cacti occur, but herbaceous plants are rare. The trees remain low and often are stunted. It is usually very difficult to distinguish between trees and shrubs. The extent of the Caatinga is considerable, covering a continuous area in northeastern Brazil as the Llanos do in Venezuela and Colombia. It stretches along the north coast from just east of Parnaiba to just south of Natal. From this broad front it extends southward and parallel to the east coast for about 17° of latitude, but it remains separated from the east coast by a narrow strip of a more luxuriant forest. The western boundary is not distinct, the Caatinga merging gradually with the moister savannas in the heart of the continent. The transition occurs roughly along a line from Parnaiba to Campo Belo.

AFRICA

Veld (Dutch):[10] This South African formation is primarily a grassland. It covers a large and continuous area comprising the northeastern part of the Cape Province and quite the larger part of the Orange Free State and of Transvaal. It

[9] Frenguelli, J.: *Rasgos Principales de Fitogeografía Argentina,* La Plata, 1941.

[10] The discussion of the Veld is based on: Adamson, R. S.: *The Vegetation of South Africa,* London, 1938, pp. 122–76.

reaches somewhat beyond the Limpopo river in the north. The boundaries of the Veld are quite obscure because it merges very gradually with the neighboring regions and any clear outline becomes impossible. The matter is further complicated by the fact that the vegetation of the Veld is not uniform. Grasses, of course, dominate. It is true that trees and shrubs are often largely absent on what is called the High Veld, a term referring to altitude. But it is equally true that trees and shrubs can be very common, even to the extent of forming very light woodland of deciduous or semi-deciduous character. This type is more frequent in what is called the Low Veld, mainly east of Drakensberg but not extending into the plains of Mozambique. The Low Veld reaches far west in the Limpopo valley. On the other hand, the grasslands along the eastern coasts, which extend well into the Cape Province, are not included in the term Veld. The Veld is therefore an open grassland or a savanna west of the Drakensberg in the south and west of the Lebombo Mountains farther north. In the savanna regions the grasses are much taller than in the High Veld, but throughout the entire Veld, bunch grasses are the rule. Only very little territory of western Transvaal along the border of this state is in the transition zone towards the more arid Kalahari, but the southwest of the Orange Free State lies clearly outside the Veld. On the other hand, the Veld includes all of Basuto Land and the higher parts of western Natal.

EUROPE

Moor (English) and *Heath* (English): These terms take one to the British Isles, largely because they are English. Really, Heath and Moor refer to a vegetation widespread in northern Europe, but these names are used in the British Isles in a specific way, limited to these islands. Heath,[11] as a matter of fact, refers simply to an abundance of one or more ericaceous species, mostly *Calluna vulgaris*, the common heather. As such it is common from France to Russia and throughout the British Isles and southern Scandinavia. The heather of northern Europe requires a high atmospheric humidity and thrives best in a marine climate. It does, however, extend eastward to the Ural, where it grows in the forest. Heath as a formation is anthropogenic and would disappear soon, giving way to forests, if fires, grazing animals, and man himself were kept out.

The term Moor is less clear. As used in Great Britain and Eire it "applies in ordinary English speech primarily to (usually) high-lying country covered with heather and other ericaceous dwarf shrubs, mainly Vaccinia; though it is often used more widely . . . from bog or moss to acidic grassland. . . . For example, the elevated moorlands of the southwestern peninsula, the largest areas of which are Dartmoor, Exmoor, and Bodmin Moor, include both drier types on shallow sandy and peaty

[11] An interesting discussion of heath is found in Rübel, Ed.: "Heath and Steppe, Macchia and Garigue," *Journal of Ecology*, Vol. 2 (1914), pp. 232–37.

soil and wetter types of deep peat."[12] This explains why Heath and Moor are grouped together. In bogs ericaceous plants do not always thrive, since they prefer a well-drained soil, but many bogs have nevertheless their share of heather, especially where vigorous growth raises clumps of vegetation above the surrounding level, with a correspondingly improved drainage. The great Yorkshire moors, in addition to those already mentioned, as well as those of Scotland, are to a very considerable degree covered with heather. In the British Isles, at least, a moor does not imply bog, as it usually does on the continent. The Oxford dictionary best describes the common English usage when it defines a moor as a "tract of open waste ground, especially if covered with heather." Evidently a moor is a heath.

On the European continent, Moor frequently refers to a peat bog with poor drainage, while Heath is more prominent on excessively drained soils, such as sands, etc. But even on the continent one knows the moor-heath (*Moorheide*), indicating the extension of heather beyond the sands and into the bogs. German authors frequently use the term *Heide* (heath), not just for an ericaceous formation but for any dwarf shrub formation. In the English language, this is not a desirable method and the term Heath should be strictly limited to the ericaceous formations of northern Europe.

Garigue (Provençal) and *Maquis* (French, from Italian) or *Macchia* (Italian, originally Corsican): Both terms are at home in the western Mediterranean Basin and refer to the same type of evergreen shrub vegetation. The difference is physiognomic. The Garigue consists of low, rather stunted growth of widely spaced bushes with a variety of herbaceous plants that dry up during the hot summers. The Macchia is a thick continuous formation of taller shrubs. The cause of the difference is edaphic: the Garigue occurs on a calcareous substratum whereas the Macchia developes on one of a siliceous nature. This, however, applies only to the Provence. It is well known that a Macchia formation of truly luxuriant development occurs on the limestone mountains of Dalmatia.

Both Garigue and Macchia are anthropogenic and disappear if man, goat, and fire are prevented from interfering. Under the influence of human settlement, the original forest of tall oaks (*Quercus ilex*) gradually gave way to the scrub oak (*Q. coccifera;* in Provençal, *garroulia,* hence garigue). Numerous examples have shown that upon return, the original oak forests are now largely mixed with pines, probably introduced from the eastern Mediterranean (*Pinus halepensis* on rocky soils, *P. pinea* on deep soils).[13] Whether in the end the oaks will once more triumph cannot now be stated, for no such return to forest has been permitted to survive for a sufficiently long period.

[12] Tansley, A. G.: *The British Isles and Their Vegetation,* Cambridge, 1939, p. 673.
[13] de Martonne, E.: *Traité de Géographie Physique,* III, Paris, 1927, p. 1274.

Puszta (Hungarian): This well-known term commonly refers to the grasslands of the Pannonic Basin or, more specifically, to the Great Alföld. The scientific investigations into the nature of the Puszta have not generally been read by the lay public, but prose, poetry, and drama of the literary world have done much to create in the minds of many a vision of endless grassy plains, scorched by a pitiless sun and without a tree from horizon to horizon. Curiously enough, of all regional vegetation terms, Puszta is perhaps the least applicable today. The vast Hungarian plains have largely come under the plough. This practice, if carried on on a sufficiently large scale, is in itself enough to destroy wholesale the natural vegetation of a region. And without any doubt that is the case in Hungary.

But there is another reason, quite as serious. De Soó[14] has shown that the Puszta, that is the grassland, is largely anthropogenic. According to him, neither soil nor climate justifies the grassland. In fact, if there were no interference with the evolution of natural vegetation in the Pannonic Basin, most of the vast plains would develop a forest cover of considerable variety. Even today, the forests are advancing and spreading wherever man is off guard. The variations in the physiognomy of the forest are due to edaphic conditions, for both climate and topography are remarkably uniform. The term Puszta is definitely linked with grass, and where forests occur, or even small planted groves, the term is no longer used. There are still patches of Puszta of varying size, but if the agricultural development should continue as during the last hundred years and if forestry should be expanded, as is possible if not probable, then the Puszta will soon be nothing more than a memory.

ASIA

Tundra (Russian): Originally of northern Russia, this term has spread throughout the high latitudes and refers to all vegetation on the polar side of timberline. Although in the minds of many less informed people the Tundra is a mossy bog, it is actually a plant association of considerable variety. The dominant plants may be mosses, as is so often the case in Eurasia, or lichens, more often in North America. A grassy tundra is not at all uncommon with grasses, sedges, and broadleaf plants. Trees are absent, but shrubs are not uncommon and the bush Tundra of northern Eurasia covers large areas. The transition with the Taiga is gradual, of course, and as the first trees are widely spaced and dwarfed, the boundary between the Taiga and the Tundra is frequently a broad transition zone which the Russians call Taibola. It is entirely acceptable to use the term Tundra in circumpolar fashion and this practice has been generally adopted.

It is an altogether different matter when some authors try to extend Tundra to high altitudes in lower latitudes. Here, too, a low vegetation flourishes beyond tim-

[14] De Soó, Ralph: "Die Vegetation und die Entstehung der ungarischen Puszta:" *Journal of Ecology*, Vol. 17 (1929), p. 329 ff.

berline, but this is no longer a horizontal difference but a vertical one. The high altitudes of lower latitudes are not the same as the arctic plains of Eurasia or North America. Although the average temperature may be low, the growing conditions on high mountains in lower latitudes are fundamentally different from those in the polar plains. Insolation, seasonal variations of light and heat, soil conditions, and water supply all differ so much that the resulting vegetation may not be referred to as Tundra. The luxuriant vegetation of the high Alps in Switzerland or the high Andes in Colombia cannot possibly be termed Tundra. The author joins Troll[15] in his protest against the tendency of some authors to consider the Tundra the equivalent of alpine vegetation above timberline. In order to avoid confusion, Tundra should be used exclusively where it represents the only vegetation at any altitude. As soon as an altitudinal stratification sets in, the term Tundra should be discontinued. Of course, there are direct continuations from low arctic altitudes *beyond* timberline to higher altitudes *above* timberline, as in the Rocky Mountains, the Ural, or the Kiöllen Mountains. But in spite of this continuity the term Tundra should not be applied where a vertical ascent above other formations is necessary in order to reach it.

Taiga (Russian): This term refers to the vast coniferous forests that span the globe in high latitudes south of the Tundra. Like Tundra, Taiga is a Russian word, applied at first only in Eurasia but later extended to very similar plant associations in North America. A few broadleaf deciduous tree genera are scattered throughout the Taiga, especially near streams. Birch and willow are the most common of these. Otherwise the Taiga is a huge monotonous forest of needleleaf trees, mostly pines, spruces, and larches. Its character changes considerably from north to south. Near the Tundra, the physiognomy of the forest displays all the difficulties under which the trees have to fight for their existence. Southward the trees grow more closely together, grow taller, straighter. The southern limit of the Taiga is the appearance of a transition zone toward broadleaf deciduous forests or grasslands. Both the northern and southern limits of the Taiga vary enormously in latitude, with as much as 20° variation for the northern timberline. The Taiga is limited to the higher latitudes of the northern hemisphere; there is no Taiga south of the Tropic of Cancer.

Steppe (Russian): The vast grasslands that reach from the lower Danube to central Asia bear the name Steppe. Russian students of vegetation distinguish between a variety of subdivisions but the term is all-inclusive and implies treeless grasslands. The height of the grasses varies from tall to short, and dicotyledonous herbs are often frequent, though not implied. The northern and western borders of the Steppe are a parklike transition to forest, while the southern limits are quite indistinct; the edge of the desert is too elusive.

[15] Troll, Carl, *op. cit.*, pp. 60–64.

In view of the wide use of the word Steppe all over the world, it may at first seem astonishing that the Steppe is here included. But the abuse of the term has been so great and the meaning of the term so variable as actually to lose its significance. Allan[16] lists 54 uses of this overworked term and claims he can add more. These uses carry entirely different and even contradictory implications. This author agrees with Allan that the Steppe best remains in its area of origin.

Terai (*Hindustani*): This is a swampy grassland of tall, coarse grasses in the southernmost foothills of the eastern Himalayas. It comprises a very definite zone, so wild, so impregnated with lethal fevers that for many centuries it has separated Hindustan's plains from the regions to the north far more effectively than have the mighty Himalayas. This is clearly shown by the racial composition of the southern slopes of this mountain range: the mongoloid people from the north filtered through the passes in the summer, herding their animals and getting established as far south as the Terai. Occasional gateways have permitted the plains people to get a better foothold in the mountains, as in Sikkim, but this is the exception rather than the rule. The Terai reaches along the southern border of Nepal (but not farther west), and eastward the entire length of the Himalayas. It is long and rather narrow, limited to the first slight elevations above the plains and thus representing the outermost zone of the Himalayan uplift. Pioneers from the south now push into the Terai in increasing numbers, draining the swamps, and making them fit for habitation and production.

AUSTRALIA

Mallee (Australian): The Mallee is the only one of the Australian terms that is being used by the Australians as a localizing vegetation term. Its outline is vague enough, largely restricted to the southern part of the continent. It is especially the area of northwestern Victoria and the Eyre Peninsula of South Australia that come to mind when speaking of Mallee, as well as large sections of western Australia, south of Queen Victoria Springs and westward to the ocean.

Mallee derives its name from *Eucalyptus dumosa* which the Australians also call Mallee. The Mallee is a densely growing evergreen shrub formation which, however, does not consist of pure stands of *E. dumosa*. Considerable variations are frequent.

According to Taylor,[17] the terms mulga and brigalow refer strictly to species of Acacias and have no regional implications. The boundaries of the Mallee are not well known, partly because available vegetation maps of Australia are inadequate.

[16] Allan, H. H.: "Tussock Grassland or Steppe?" *The New Zealand Geographer*, Vol. 2, No. 1, pp. 223–234.

[17] Taylor, Griffith, in a personal communication, dated 7 April, 1947.

This list is not complete, of course. Terms like Fen (England), Taibola (Russia), Savoka (Madagascar), Moos (Germany), Buritisal (Brazil), Tussock (New Zealand), and a host of others have been omitted because either the area to which they refer is very small or they are quite unknown outside their home regions, except to a limited number of students of vegetation. Their omission here does not reflect on their standing. The term Jungle is not included because almost every author attaches a different meaning to it. Vestal[18] has shown that the term Jungle does not now imply a type of vegetation, nor is it a localizing vegetation term. Even in the past the meaning of Jungle seems to have been quite vague. The fate of Monte is similar: authorities like James, Kühn, Frenguelli, and others all disagree so thoroughly on location and extent of this formation that it has been omitted. Nor are Savanna[19] and Selva listed here as they are no longer localizing vegetation terms. A scientific terminology as used in the Geographic System of Vegetation can, of course, be applied anywhere on earth but it is by no means exclusive of regional names. In fact, there is much good reason why such regional terms should be retained and used whenever appropriate; their elimination would mean a serious loss. The names of these vegetal units are a treasured part of the cultural heritage of their respective regions, and as such have intrinsic values that must not be underestimated.

[18] Vestal, Arthur G.: "Use of Terms Relating to Vegetation," *Science*, Vol. 100 (1944), p. 99.

[19] The reader is referred to the excellent discussion of the term Savanna in Waibel, Leo.: "Place Names as an Aid in the Reconstruction of the Original Vegetation of Cuba," *Geographical Review*, Vol. XXXIII (July, 1943), pp. 376–96.

A GEOGRAPHIC CLASSIFICATION OF GEOGRAPHY MATERIAL AS BASED UPON THE DEWEY CLASSIFICATION SYSTEM

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IT IS a matter of common knowledge to geographers and librarians alike that both the Dewey Decimal system and that of the Library of Congress fail to provide a *geographic* classification for most of the academic publications appearing particularly in the various branches of the rapidly expanding field of *human* geography. The following remark by one of forty-four librarians who have indicated this inadequacy is to the point: "Certainly neither the Library of Congress nor the Dewey Classification System is adequate for organizing modern geography material. Both of these schemes have widely separated locations for the various aspects of geography, and neither seems adaptable for use with a geography collection."

NATURE OF THE DEWEY CLASSIFICATION

The Dewey system is based on decimal nomenclature. It recognizes 10 "classes" of knowledge. Each class is divided into 10 "divisions." And each division is in turn separated into 10 "sections." History (900) is one of the classes, and Geography (910) is one of its divisions. Geography in turn is divided into the

It is obvious that no study of this kind could achieve its purpose without a representative survey of library cataloging practices and without the cooperation of librarians who are conversant with the classification problems of geographic materials. Such cooperation is hereby thankfully acknowledged. The author is particularly grateful to those librarians whose concrete suggestions have pointed the way to a better application of Dewey to the classification and cataloging of geographic materials.

The objective of creating at Valparaiso University a more unified catalog and shelf arrangement of books genuinely geographic has brought the author into numerous conferences on the problem with the local librarian and cataloger, Mrs. Katherine Bowden, whose services as catalog counselor proved invaluable.

The painstaking task of bringing together, codifying, and evaluating questionnaire material was most ably carried out by Miss Vera Bushing, an advanced geography major and student assistant in the Valparaiso University library, and subsequently a Library Science degree student at the University of Chicago.

Miss Doris Kurth, Miss Harriet Fricke, and Mr. Harold Raybould, geography students, assisted in the lettering of the several charts.

For the splendid assistance of these and other participants in the project the author feels deeply indebted.

following 10 sections: Geography and Travels (910), Historic Geography (911), Maps (912), Antiquities (913), Europe (914), Asia (915), Africa (916), North America (1917), South America (1918), Oceania, Polar Regions (1919). The 910 section is further subdivided into subsections, as indicated in Figure 1.[1]

The "Relative Index" of Dewey is a guide to the numbering and finding of material based on numerous "subject" headings arranged alphabetically. Thus under "Geography" we find listed in sequence Ancient Geography, Biblical Geography, Commercial Geography, Descriptive Geography, Historic Geography, Maps, Military Geography, Physical Geography, and Political Geography.

Now, to "Historic Geography" has been assigned the call number 911 (History 900; Geography 910; Historic Geography 911).

On the other hand, "Commercial Geography" has the notation 380.9 (300, Social Sciences: 380, Commerce; 380.9 Commercial Geography).

These two references illustrate a discrepancy in classifying geographic material and will thus serve as one example to illustrate the classification problem. In the two compound subjects the word "geography" appears as the substantive term, which should be the primary classification base. Yet in the second case—Commercial Geography—the classification nomenclature calls for a "commerce" call number and thus reduces "geography" to an adjective status. Accordingly books on Commercial Geography and Economic Geography should then be renamed Geographic Commerce and Geographic Economics, respectively. But there are no published books by such titles. According to this illogical arrangement Economic Geology should become "Geologic Economics." But Dewey classifies Economic Geology as Geology (553), and not as part of Economics (330). Then why should not a book on Economic Geography or Commercial Geography be classified and codified as Geography (910) instead of Economics (330) or Commerce (380)?

Illogical and inconsistent practices of cataloging genuinely geographic material, such as the above, are revealed by a survey of the classification practices of one hundred of the largest school libraries in the country, to whom a questionnaire was addressed on this subject.

Librarians were asked whether books in such categories as Social Geography, Economic Geography, Conservational Geography, Historical Geography, Political Geography, and Military Geography can be given an appropriate geography call number under the present system of cataloging. Those recognizing a problem here were invited to report their experiences and to suggest possible solutions. A list of books was submitted to determine the call numbers now being assigned.

[1] For the complete guide to classification see "Decimal Classification and Relative Index" by Melvil Dewey, *Forest Pres, Lake Placid Club*, Essex Co., N. Y.

The Cutter classification nomenclature designating the authorship of a book is not an element of our geographic classification problem.

DECIMAL CLASSIFICATION & RELATIV INDEX
BY MELVIL DEWEY

910 GEOGRAFY TRAVELS DESCRIPTION

INCLUDING TOPOGRAFY, MAPS, ANTIQUITIES, DESCRIPTIONS, ETC. FOR MAP PROJECTIONS, SEE 526.8. SEE ALSO 310 STATISTICS, 390 CUSTOMS AND COSTUMES. FOR DIRECTORIES, GUIDEBOOKS, GAZETEERS, ETC., OF SPECIAL COUNTRIES OR GEOGRAFIC SECTIONS SEE UNDER THOSE SECTIONS, 914-19.

.1
.2 TRAVELER'S MANUALS, GUIDEBOOKS
.3 DICTIONARIES, GAZETEERS
.4 CIRCUMNAVIGATIONS, OCEAN TRAVEL, SHIPWRECKS AND DISASTERS, PIRATIC ADVENTURES
.5 PERIODICALS
.6 SOCIETIES
.7 STUDY OF TEACHING OF GEOGRAFY, SCHOOL MAP DRAWING (FOR PRIMARY TEACHING OF GEOGRAFY SEE 372.89)
.8 COLLECTIONS OF TRAVELS, ETC.
.9 HISTORY OF GEOGRAFY, TRAVELS, EXPLORATIONS, ETC.

911 HISTORIC GROWTH AND CHANGES IN POLITICAL DIVISIONS, ETC. (SUBDIVIDED LIKE 930-999)

912 MAPS, ATLASES, PLANS OF CITIES, ETC. (SUBDIVIDED LIKE 930-999)

913 ANTIQUITIES, ARCHEOLOGY OF SPECIAL COUNTRIES

(SEE ALSO 220.93 BIBLICAL ANTIQUITIES, 340.3 LEGAL ANTIQUITIES, 571 PREHISTORIC ARCHEOLOGY, 930 ANCIENT HISTORY, 390 SPECIAL CUSTOMS)

.3 ANTIQUITIES OF ANCIENT COUNTRIES (SUBDIVIDED LIKE 930, E.G. 913.32 EGYPTIAN ANTIQUITIES. ANTIQUITIES OF COUNTRIES HAVING BOTH ANCIENT AND MODERN HISTORY NUMBERS SHOULD BE CLAST IN 913.3 UNLESS THE ANTIQUITIES RELATE WHOLLY OR MAINLY TO THE COUNTRY AFTER IT ENTERED THE MODERN PERIOD)

.4-.9 ANTIQUITIES OF MODERN COUNTRIES (SUBDIVIDED LIKE 940-999, E.G. 913.42 ENGLISH ANTIQUITIES. SEE ALSO NOTE UNDER 913.3)

914 EUROPE
915 ASIA
916 AFRICA
917 NORTH AMERICA
918 SOUTH AMERICA
919 OCEANIA AND POLAR REGIONS

914-919 IS SUBDIVIDED LIKE 940-999. WHENEVER THESE MAIN GEOGRAFIC HEDINGS OCCUR THEY MAY BE SUBDIVIDED EXACTLY LIKE HISTORY. THE FULL LIST OF SUBHEDS IS PRINTED ONLY UNDER 940-999. IN ASSIGNING NUMBERS TO TRAVELS, USE THE HISTORY TABLES, INSERT 1 AFTER THE INITIAL 9, AND MOVE THE DECIMAL POINT; E.G. GUIDE TO N.Y. CITY IS 917.471, FOR N.Y. CITY IN HISTORY TABLES IS 974.71

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FIG. 1. Dewey classification table for geography. (Reprinted with permission of the copyright owners, Lake Placid Club Education Foundation, Lake Placid Club, N. Y.)

This survey revealed that books, by geography specialists, with a distinctly geographic title, with genuine geographic contents all the way through, and designed primarily for classes in geography taught by professional geographers, were in many instances given non-geographic call numbers. This practice results in a scattered, unsystematic, and illogical cataloging and book-shelving arrangement. It defeats the very purpose of a library classification itself and detracts immeasurably from the efficient use of the geography section, if there is any at all.[2]

From an academic point of view such a chaotic situation in classification also impedes the general program of geographic education and research in the United States, whose citizenry is proverbially noted for its geographic illiteracy. Though this problem has been recognized a long time as a chronic one in library classification, it has become especially acute in the last several years as a result of the rapidly multiplying number of publications in the field of human geography, the expansion of geographic curricula at all levels of instruction, and the creation of new departments of geography in scores of institutions throughout the country. The greater the procrastination in revising the conventional nomenclature used in classifying geography material, the more numerous will be the books whose call numbers will have to be changed to fit the new geography classification requirements.

The purpose of the present paper is to cite specific examples of indiscriminate and unscientific cataloging of geographic material, and to stimulate, by concrete suggestions, a solution to the problem as far as libraries are concerned which use the Dewey Decimal system and which do not feel free to use a specially designed system for geography, such as has been used by the American Geographical Society.[3]

The returned questionnaires of over a score of librarians generally reflect a constructive interest in the results of this study. A few quotations will serve to illustrate representative reactions under the several categories indicated:

Revision welcomed: "Any attempt at revision, particularly of the Dewey system, which would permit a more logical arrangement of material on 'human' geography would be appreciated by librarians, I am sure."

[2] The conventional cross-index feature of the library card catalog does not solve the particular problem posed here. The problem concerns the proper classification nomenclature which guarantees sequential and contiguous file and shelf arrangement of all material genuinely geographic. Such a logical and compact arrangement expedites inventory of geographic materials and instant examination or consultation of closely related works.

Moreover, where libraries check and report upon number of withdrawals of various classes of books, such as history books, economics books, geography books, etc., how can a correct report on geography book withdrawals be given when many of the geography books are checked out under non-geography call numbers, thus showing an erroneously small figure of circulation for geography books as such?

[3] This study of a revised geographic classification is confined to the Dewey Decimal system, 70 per cent of the libraries chosen at random using this system. It is hoped that a similar study will be made for the Library of Congress system, which is likewise defective in geographic classification.

Time for revision opportune: "I wish I could be of more assistance to you in your problem, especially since the growing work and interest in global geography will soon make it a problem to all libraries."

Concrete suggestions for revision desired: "We hope that your study will result in specific recommendations for revisions of sections of Dewey relating to this field."

Publication of revised classification requested: "If something based on Dewey should be worked out, I should like very much to see it published in separate form as soon as it is completed."

RECOGNITION OF THE PROBLEM

Replies to the questionnaire indicate that the non-geographic cataloging of geographic material and its consequent problem is widely recognized. A few representative observations point to the perplexing and disconcerting situation:

A librarian laments that "The subject has always bothered me because I have realized that the [geographic] material was being scattered through the whole classification." Another librarian includes a number of categories: "I do not feel that books in the field of economic geography, geopolitics, historical geography, anthropological geography, etc., can be satisfactorily classified according to this system, if one desires to keep such books together under a general symbol of geography."

Several librarians interested in the problem of dispersion of geography books report the reactions of college departmental representatives: "The Head of our History Department . . . agrees that the present systems are inadequate." Another: "We have at present no adequate satisfactory system of classification for geography material. We have used the Dewey Decimal System, the limitations of which both we and our Professor of Geography fully recognize." These remarks conclude with the significant statement: "We look forward to working out in the future some more satisfactory system of notation."

DISSENTING VIEWPOINTS

Obviously local library conditions and requirements vary from one locality and institution to another, as do the experiences and practices of librarians in compiling the card catalog and in arranging book material on the library shelves. It is not to be expected, therefore, that there will be one-sided reaction to the proposal of such an innovation as a new system of classification or the modification of an old one.

Some of the respondents to our questionnaire stated they experienced no local problem in the classification of geographic material. A number of them were not in favor of such a change. A system unlike the present one, so individuals say, would seem inapplicable, or inconvenient, or adaptable only to departmental or specialized technical libraries.

On the point of library adaptability the following quotation is representative: "I think this situation would be met as a problem more in a departmental library than in a centralized one. At present we are not a departmental library; therefore the situation has not been so much of a problem to us as yet."

Defending the present system is the view that scattering of geography books is actually "more useful": "From my experience I would say that the average library would be better off to scatter the various divisions of geography in the classifications as now provided by the Dewey scheme, as its various facets also tie in with some other phase of the classification—economic and commercial geographies for instance would be more useful under economics or under commerce, than in a separate geography section."

Sentiment against recognizing geography works as geography is in many cases defended by feeling the need of vigorously adhering to the so-called "subject" base of classification. An example: "I agree with the principle of classifying geography books under the specific subject of Economics, Anthropology, etc. I think users of the stacks would prefer to find all books on Economics [?] together."

A specific subject classification analysis is illustrated in the following remarks: "We have classified special geographies with their subjects, in accordance with the general principle of classification that the applications of a given subject are classified with that subject, e.g. Economic geography 330.9, Commercial geography 380.9, Military geography 355.47, Conservational geography 333.7–.9 (natural resources) or 339.49 (national resources)."

In pleading for a revised nomenclature to fit the needs of modern geographic education and research there would be no point in suggesting that the "subject" basis of cataloging as such is invalid or impractical. It is the *kind* of subject and code number we assign the subject which is the point at issue.

We ask again: Why should geography books be classified "under the specific subject of Economics, Anthropology, etc."? If Economics is a "subject," then why is Geography not a "subject"? And just as "users of the stacks would prefer to find all books on Economics together," would not users of the stacks "prefer to find also all books on Geography together"? We well realize that the "Dewey numbers suggested on the L.C. cards" serve as a convenient, if not in all cases logical, guide to classification of geography material. But wherever illogical, why not correct the situation, either on the L.C. cards, or by the local cataloger!

A GEOGRAPHIC CLASSIFICATION LONG OVERDUE

Geographers have long recognized the need for a more logical, systematic, and unified method of classifying geographical material. Several attempts have been made to provide an entirely new nomenclature independent of the current standard systems of library classifications. Such is, for example, the one "submitted by a committee to the Council of the Association of American Geographers at its meeting at Syracuse, N. Y., December 30, 1936, and published by the direction of the Council."[4]

[4] Boggs, S. Whittemore: "Library Classification and Cataloging of Geographic Material," *Annals Assoc. Amer. Geogs.*, Vol. 27 (1937), pp. 49–93.

This system has both a subject and a regional basis. The main divisions comprise the following catalog units: (1) General Geography, (2) Travel and Exploration, (3) Mathematical Geography, (4) Physical Geography, (5) Human Geography, (6) History of Geography, (7) Geography Teaching, (8) Aids to Geography Study, (9) Historical Geography.

The advantage of a system of this kind is that it is not bound by any antiquated and inflexible criteria of classification whereby the material must be classified to fit the system; instead, the system is adapted to fit the material. It is governed wholly by the nature and needs of present-day geography. It sets up such main divisions as "Physical Geography" and "Human Geography" which are not now regularly recognized as an integral part of geography in the Decimal classification. Subdivisions are provided under Human Geography, such as Social Geography, Economic Geography, Political Geography, and Military Geography, to provide proper places for books in these categories.

The system conforms to the most critical standards of the principles of library classification. But it is an entirely new one, and so does not fit in with the pattern of notations used by either the D.C. or the L.C. system. The result is unfortunately a restricted usefulness, limited to private and societal libraries. Meanwhile, where no separate departmental libraries exist, geography material continues to be scattered all over the general library.

The problem, then, is to find some way to keep those books which are indisputably geographic together, to the same extent that other departmental books, like history books, are kept together.

It is recognized that any modified plan suggested for bringing real geography books together in the library under the standard systems of classification needs to enlist the interest and support of catalog codifiers and librarians. Accordingly, we communicated with about one hundred librarians having a wide and representative geographic distribution throughout the country to determine their problems and viewpoints as to classifying geography material under the D.C. system.

A list of fifty-four selected books was submitted in the questionnaire to determine the present status of geographic classification as indicated by the kind of call numbers given to the books on the library shelves. A wheel chart (Fig. 2) has been prepared to show at a glance the call numbers of these books as assigned in the various libraries. The number of libraries assigning a given call number is shown in the outer ring opposite the call number.

A mere glance at the chart indicates a most promiscuous classification situation. Thus, in the division of social geography, Geographer Semple's well-known work *Influences of Geographic Environment* (No. 42) is classified in at least ten different categories. Forty-one libraries catalog it in Somatology (573); sixteen libraries put it with Geography, distributed among 910, 910.7, 911, and 917; two libraries assign it to U. S. History (973); two to Ethnology (572), and one each to Sociology (302), Commerce (380), and Physical and Dynamical Geology (551). Other examples are cited below.

Except in a few cases where decimal numbers are shown, only major divisional classifications are represented on the chart. The addition of sectional and subsectional classifications would materially increase the number of variable assignments.

Titles reflective of the human aspect of geography frequently disqualify a book for geographic classification. Thus, in spite of its title, *Human Geography in the Air Age,* George T. Renner's book is classified under Education (372.862). Griffith Taylor's geographic work on *Environment, Race, and Migration* is assigned to Ethnology (572). A singular inconsistency is also noted in classifying works in regional (continental) geography. Although both books are avowedly geographic, George B. Cressey's book on *Asia's Lands and Peoples* is given a geographic call number (915), whereas Preston E. James' geographic work *Latin America* is assigned to Economics (330.898).

Out of a total of some 30 books of a distinctly geographic character listed on the chart, only 7 have been assigned geography call numbers by librarians.

Obviously, the Dewey system as it now functions makes for neither uniformity nor unity of classifying geographic material. It is confusing to the librarian who is trained to think in terms of a logical and consistent system of classification of material. It is disconcerting to the geographer who must search in out-of-the-way places for the books he was in most cases responsible for placing in the library, books he uses almost daily and which only occasionally may be used by other departments. Imagine a geographer or librarian in a certain library visiting six different sections to put the following geography books on the geography reserve section:

Author	*Title*	*Dewey Classification*
Bauer	*Globes, Maps and Skyways*	330.9—History of Economics
Fairgrieve	*Geography and World Power*	573.4—Influence of climate and surroundings
Horrabin	*An Atlas of Current Affairs*	911—Historic growth and changes in political divisions
Horrabin	*An Outline of Political Geography*	912—Maps, atlases, plans of cities
Huntington	*Principles of Economic Geography*	573.4—Influence of climate and surroundings
Renner	*Human Geography in the Air Age*	375.62913—Curriculum course of study
Semple	*Influences of Geographic Environment*	380—Commerce
Van Cleef	*Geography for the Businessman*	550—Geology
Whitbeck	*Economic Geography*	550—Geology

In surveying the possibilities of a solution to this problem, it is well, first of all, to explore the basic reasons for the existence of the problem. It would appear from the examples of call numbers referred to above that the weakest point in the D.C.

system is the failure to recognize the various branches of the section of modern geography known as Human Geography as an integral part of the field of Geography. Some of its subdivisions are included in Geography; others, like Economic Geography and Commercial Geography, are excluded. It is noteworthy, on the other hand, that "travel" and "antiquities" should have received such generous geographic recognition—some half-dozen classification categories.

LACK OF UNIFORMITY IN CLASSIFICATION

The first test of the adequacy of any classification would seem to pose a question something like this: "Is there any semblance of inter-library uniformity in cataloging standard academic works?"

The present system of classifying geography books does not satisfactorily meet this standard. A report of some 30 large libraries reveals, for example, the startling fact that Ellsworth Huntington's *Principles of Economic Geography* (No. 25) has been assigned call numbers in as many as seven major classification divisions: Economics (330), Commerce (380), Somatology (573), Geography (910), Biology (570), Geology (550), Teaching (910.7).

Yet here is a work by a geographer with an international geographic reputation, a book with a geographic title, with chapter contents geographic through and through, and designed primarily as a text for classes in geography, taught chiefly by professional geographers, and in nine cases out of ten found as a reference work on the geography reserve section, if it has been withdrawn from the general stacks.

A similarly illogical situation is illustrated in Political Geography by Whittlesey's *Earth and State* (No. 53), classified in seven categories—Historic Growth of Geography (911), Geography (910), History (909), Geology (550), Commerce (380), Economics (330), and Political Science (320). In forty-three libraries it is cataloged under 320; in only seven are the call numbers geographic.

A *Geographical Introduction to History* by Febvre (No. 17) serves to point up the case for works in Historical Geography. It also appears in seven different categories—Sociology (301), Sociology (302.7) Ethnology (572), Somatology (573), History of Civilization (901), Geography (910), and Historic Growth of Geography (911). Here Geography shares only four out of a total of forty-two catalogings.

Obviously, the Dewey system here breaks down almost completely in its notation and relative index to satisfy one of its own standards, namely, that "books of the same character always be put in the same place, and there be some means of knowing readily what that place is."

LACK OF UNITY IN CLASSIFICATION

But what is even more disconcerting to the geographer is the lack of unity in the classification of geography material in any particular library. From the study of a certain library, the following findings are in point: In the field of Political

Geography, Horrabin's *Outline of Political Geography* is assigned to 330.9, the same number as is given to Bengtson and Van Royen's *Fundamentals of Economic Geography*. Boggs' *International Boundaries* is assigned to Political Science (320.12), whereas Bowman's *New World* is assigned to Foreign Relations (327), Colby's *Geographic Aspects of International Relations* to International Law (341.04), and Whittlesey's *Earth and State* to Political Science (320.12).

In the same library, Van Valkenburg's *America at War* is assigned to European History (940.5373), although its subtitle, "A Geographical Analysis," announces this to be a geographical book; moreover, the fly-leaf declares it one of the publisher's geography series, and all the nine chapters are distinctly geographic. The editor, as well as the consulting editor, is a recognized geographer; the foreword is by a geographer and Director of the Graduate School of Geography of Clark University, who states that each of the five colleagues making chapter contributions "are experts in the various fields of geography which they represent." Yet all this evidently carried no weight in favor of placing the book in the geography section. On the other hand, Van Valkenburg's *Elements of Political Geography* and Fairgrieve's *Geography and World Power* were both put into Geography (910).

WHAT IS GEOGRAPHY?

The kind of answers we give to this question will largely determine the policy and practice of classification of geography materials.

The book titles submitted to librarians as indicated on the chart (Fig. 2) were selected as representative of general library books with different degrees of geographic quality in order to bring out the various problems of geographic classification. It must be recognized at the outset that one of the most difficult jobs which a cataloger will always have to face is the fundamental question of whether a book is primarily geographic or something else. If geography were as well understood as, for example, history, or economics, there would be little trouble.

But a glance at the chart will indicate that there is no uniform and unified conception of what the nature and function of geography are.

Two common misconceptions seem to be basic to the problem:

1. If the book treats of the "physical" environment, then it must be geography (or geology); but if it refers to people, then it must be something else—anthropology, history, political science, economics, or sociology.

2. If the book is purely "descriptive," travelogue-like, then it is unquestionably geography; but if "interpretations" or explanations are offered as to how and why human settlement, activities, institutional patterns and problems of peoples and nations differ in one part of the earth as compared with another, then *ipso facto* it must be classified as non-geographic.

Modern Human Geography with its physical and cultural concepts and principles, comparative analyses of areas, and evaluations of regional resources and of national

power calls for other classification headings than mere "description," "antiquities," and "travel."

Perhaps the chief difficulty in the way of a correct evaluation and classification of geographic material arises from the fact that the distinction between geography and the other fields mentioned is made on the basis of the *kind* of earth facts treated rather than the *way* such earth facts are treated. Anthropology, history, economics, and sociology may all, at one time or another, treat of the same facts, but their treatments differ one from another. Each has a distinctive point of view in the way the facts are presented, emphasized, and related one to another. As for geography, it "studies the world, seeking to describe, and to interpret the differences among its different parts, as seen at any one time, commonly the present time. *This field it shares with no other branch of science* [italics supplied]."[5]

A further elucidation of the field of geography is a statement prepared during the war by the War Manpower Commission:

> The geographer studies the nature and use of areas and is trained to interpret the distributions, interrelationships, and interactions of physical and cultural phenomena on the earth's surface. He is concerned, for example, not only with the nature of the land surface, vegetation, climate, mineral resources, soil and water supplies, but also with the people and the ways in which they live together and utilize land and other resources. Geography, therefore, is considered both a physical and a social science.
>
> Geographers analyze the significance of location and distribution in the study of physical and cultural phenomena, and interpret these distributions in terms of their influence on economic, social, and political development. For example, in studying an industry, a geographer may find that in spite of rapidly expanding competition elsewhere, the industry in question is so located that it will maintain advantages over competitors because of proximity to essential raw materials of low unit value coupled with an historical development of special skills in the labor populations, and favorably located consuming markets.

It would seem reasonable to expect that a professional anthropology book is written by an anthropologist, a history book by an historian, a sociology book by a sociologist, and so on. Of course, there are exceptions, but this is professionally the common practice. If, therefore, there should be some doubt in the classifier's mind as to whether the contents of a book are geographic or not—a borderline case, let us say—the chances are it is geographic if written by one or more professional geographers.

It is not contended that all books containing geographic information must be classified as geography. It is obvious that the history of any country must include some geographic concepts if it is to be meaningful, yet that does not change the fact that it is primarily a history book and should be so classified. Similarly, if the geography of a region, or of a country, or of the world includes some historic, economic, or political concepts, neither should that fact invalidate its geographic classification.

[5] Hartshorne, Richard: "The Nature of Geography," *Annals Assoc. Amer. Geogs.*, Vol. 29 (1939), p. 636 (photolithoprint with added notes and bibliography, 1946).

LIBR
CLASSIFIC
EXPLAN
1st circle: A, B, C, D • Fourfold "
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see this report.)
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3rd circle: Authors and names of
4th circle: Classification name c
5th circle: Dewey call numbers a
6th circle: The number of librari
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BOO
HIST. GROWTH OF GEOG.
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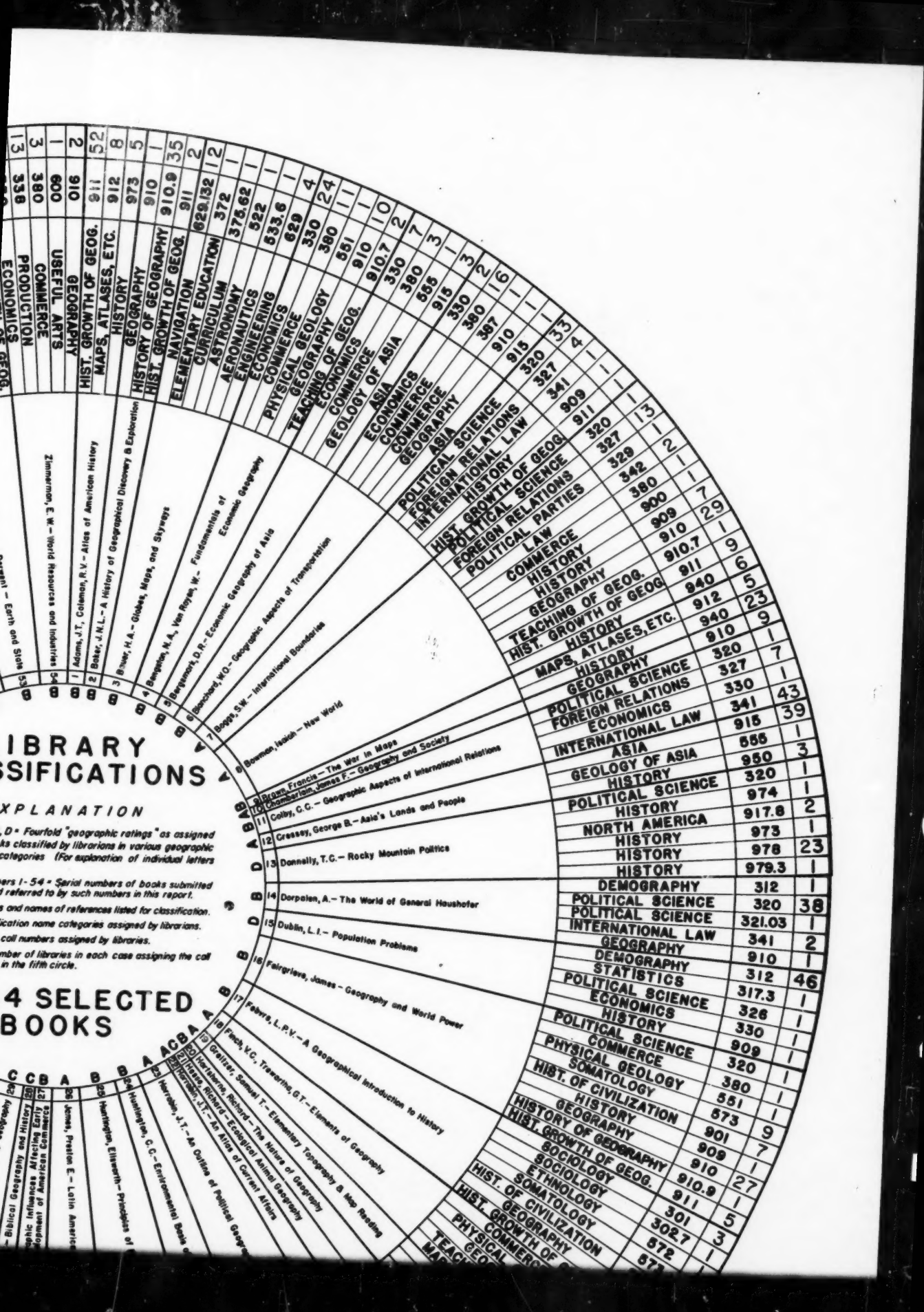
Whitbeck, R. H., Finch, V. C. – Economic Geography
Von Engeln, O. D. – Geomorphology
Von Valkenburg, S. – Elements of Political Geography
Von Valkenburg et al – AMERICA AT WAR: A Geographical Analysis
Von Cleef, Eugene – Trade Centers and Trade Routes
Von Cleef, Eugene – Geography for the Businessman
U. S. Department of Agriculture Yearbook
Taylor, T. G. – Environment, Race, and Migration
Tarr, R. S., Von Engeln, O. D. – New Physical Geography
Smith, W. – Student's Historical Geography of the Holy Land
Sample, E. C. – Influences of Geographic Environment
Sample, E. C., Jones, C. F. – American History and Its Geographic Conditions
Renner, G. T. – Human Geography in the Air Age
Renner, G. T. – Conservation of Natural Resources
Renner, G. T. – Global Geography
Perkins, A. E., Whitaker, J. R. – Our Natural Resources and Their Conservation
Nugent, D. R., Bell, R. – The Pacific Area and Its Problems
Newbigin, M. I. – Frequented Ways
McWilliams, Carey – Brothers Under the Skin
McCartney, H. H. – Geographic Basis of American Economic Life
Mackinder, H. J. – Democratic Ideals and Reality
London, C. E. – Industrial Geography
F. B. – Physiography of the United States
Whittlesey, Derwent – Earth and State
Zimmerman, E. W. – World Resources and Industries
H. W. – Ecological Crop Geography
– Biblical Geography and History
raphic influences Affecting Early
lopment of American Commerce


IBRARY
SSIFICATIONS
XPLANATION
, D = Fourfold "geographic ratings" as assigned
ks classified by librarians in various geographic
categories (For explanation of individual letters
ers 1-54 = Serial numbers of books submitted
referred to by such numbers in this report.
s and names of references listed for classification.
ication name categories assigned by librarians.
coll numbers assigned by librarians.
mber of libraries in each case assigning the call
in the fifth circle.
4 SELECTED
BOOKS
Adams, J.T., Coleman, R.V. – Atlas of American History
Baker, J.N.L. – A History of Geographical Discovery & Exploration
Brown, H.A. – Globes, Maps, and Skymaps
Bengston, N.A., Van Royen, W. – Fundamentals of Economic Geography
Bergsmark, D.R. – Economic Geography of Asia
Blanchard, W.O. – Geographic Aspects of Transportation
Bopp, S.W. – International Boundaries
Bowman, Isaiah – New World
Bram, Francis – The War in Maps
Chamberlain, James F. – Geography and Society
Colby, C.C. – Geographic Aspects of International Relations
Creasey, George B. – Asia's Lands and People
Donnelly, T.C. – Rocky Mountain Politics
Dorpalen, A. – The World of General Haushofer
Dublin, L.I. – Population Problems
Fairgrieve, James – Geography and World Power
Febvre, L.P.V. – A Geographical Introduction to History
Finch, V.C., Trewartha, G.T. – Elements of Geography
Greitzer, Samuel T. – Elementary Topography & Map Reading
Hesse, Richard – Ecological Animal Geography
Horrabin, J.F. – An Outline of Political Geography
Horrabin, J.F. – An Atlas of Current Affairs
Huntington, C.C. – Environmental Basis of Modern Civilization
Huntington, Ellsworth – Principles of Human Geography
Jones, Preston E. – Latin America
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INTERNATIONAL LAW 910 1
ASIA 320 7
GEOLOGY OF ASIA 327 1
HISTORY 330 1
POLITICAL SCIENCE 341 43
HISTORY 915 39
NORTH AMERICA 555 1
HISTORY 950 3
POLITICAL SCIENCE 320 1
HISTORY 974 1
HISTORY 917.8 2
HISTORY 973 1
HISTORY 978 23
HISTORY 979.3 1
DEMOGRAPHY 312 1
POLITICAL SCIENCE 320 38
POLITICAL SCIENCE 321.03 1
INTERNATIONAL LAW 341 2
GEOGRAPHY 910 1
DEMOGRAPHY 312 46
STATISTICS 317.3 1
POLITICAL SCIENCE 326 1
ECONOMICS 330 1
HISTORY 909 1
POLITICAL SCIENCE 320 1
COMMERCE 380 1
PHYSICAL GEOLOGY 551 1
SOMATOLOGY 573 9
HIST. OF CIVILIZATION 901 7
HISTORY 909 1
GEOGRAPHY 910 27
HISTORY OF GEOGRAPHY 910.9 1
HIST. GROWTH OF GEOG. 911 5
SOCIOLOGY 301 3
SOCIOLOGY 302.7 1
ETHNOLOGY 572 1
SOMATOLOGY 573 1
HIST. OF CIVILIZATION
GEOGRAPHY
HIST. GROWTH OF
PHYSICAL
COMMERCE
TEACH
MAP

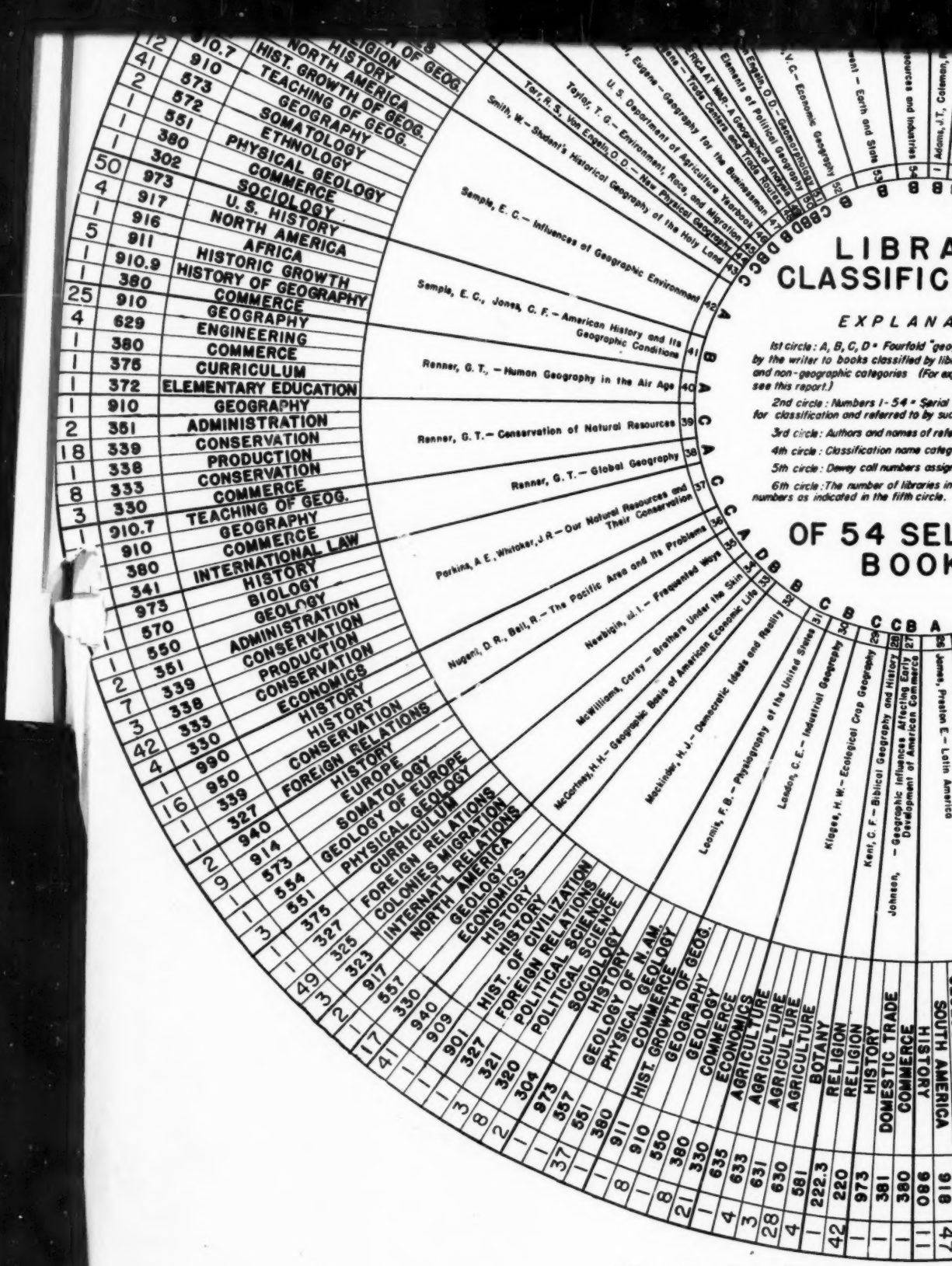
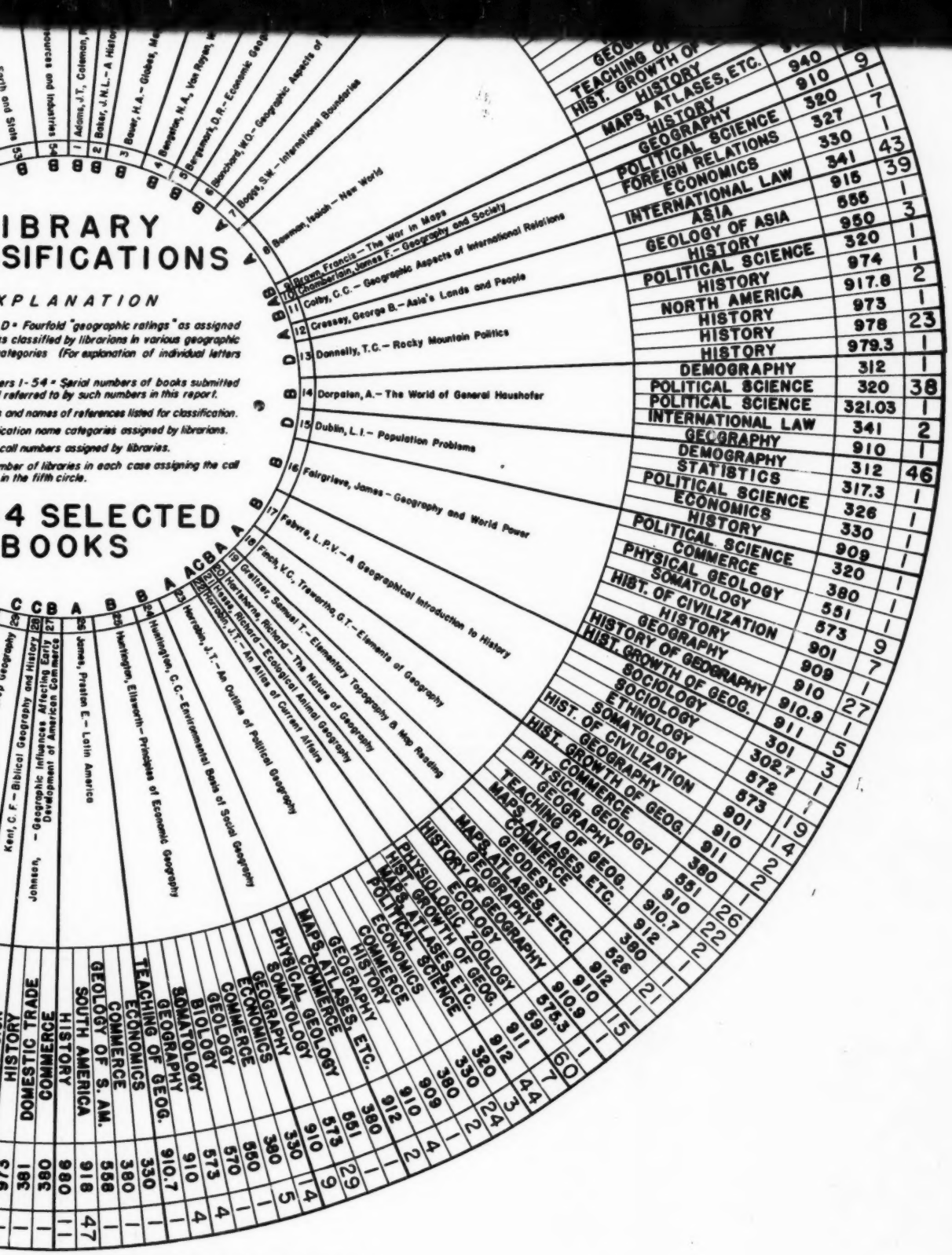


FIG. 2. The problem of Dewey geographic class
prehensive view of the diversified manner in which
the chart. References considered by the author in
labelled A and B. Explanation and evaluation of th
cussed in the text.



ographic classification. This wheel chart gives a com-
er in which libraries catalog publications indicated on
he author intrinsically and explicitly geographic are
aluation of these and other chart symbolisms are dis-

GEOGRAPHY SECTION NOTATIONS ACCORDING TO DEWEY

910.3 DICTIONARIES, GAZETTEERS

910.4 CIRCUMNAVIGATION, OCEAN TRAVEL, ETC.

910.5 PERIODICALS

910.6 SOCIETIES

910.7 STUDY OF TEACHING OF GEOGRAPHY; MAP DRAWING

910.8 COLLECTIONS OF TRAVELS, ETC.

910.9 HISTORY OF GEOGRAPHY, TRAVELS, EXPLORATION

911 HIST. GROWTH & CHANGES IN POL. DEV. - HIST. GEOG.

912 MAPS, ATLASES, ETC.

913.3 ANTIQUITIES, ARCH. ANCIENT COUNTRIES

913.4-9 ANTIQUITIES, ARCH. MODERN COUNTRIES

Lubbock: PREHISTORIC TIMES

Burton: DISCOVERY OF THE ANCIENT WORLD

Hudson: ENCYCLOPAEDIA BRIT. WORLD ATLAS

Fairgreve: GEOGRAPHY AND WORLD POWER

Baker: A HISTORY OF GEOG. DISCOV. & EXPLOR.

Holmes: TRAVELOGUES

Reitz: GENERAL CARTOGRAPHY

AMERICAN GEOGRAPHICAL SOCIETY

ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS

Rhys (Ed.) Everyman Lib.: CAPTAIN COOK'S VOYAGES OF DISCOVERY

Mayhew: CONCISE GAZETTEER

Hallpike: CHRONOLOGY

Eur 914 | Asia 915 | Afr. 916 | N.A. 917 | S.A. 918 | O.P. 919

912.73-Baker: ATLAS OF AMERICAN AGRICULTURE (U.S. Dept. of Agr.)

913.39-Smith: A DICTIONARY OF GREEK AND ROMAN ANTIQUITIES

913.71-Foote: ARCHEOLOGICAL HISTORY OF OHIO

911.73-Brown: HISTORICAL GEOGRAPHY OF THE UNITED STATES

910.94-Wright: GEOGRAPHICAL LORE AT THE TIME OF THE CRUSADES

910.8673-Gide: TRAVELS IN THE CONGO

910.773-"STANDARDS" COMMITTEE, N.C.G.T., PROF. PAPERS, Nos. 6 & 7

910.474-Spears: THE STORY OF THE NEW ENGLAND WHALERS

910.351-The Chinese Ministry of Information: CHINA HANDBOOK

910.2494-Baedeker: SWITZERLAND

ALUMINUM INDUSTRY OF EUROPE

THE U.S., A PED.-GEOG. SURVEY

910
GENE
DESCRI
G E O G R

Finch and Trewartha: ELEMEN

GUIDE TO CLAS

1. Use 910, the "class" number for geography and for all other geography treatises not speci any of the 32 subdivisions indicated on this cha Elements of Geography.

2. Use 910.1 as a "prefix" or generic number which the particular branch of geography is Economic Geography, 910.133; 910.1 (geography

3. Use the conventional Dewey nomenclature fo areal subdivisions for a simple "regional" classifi Economic Geography of Canada, 917.71; 917

4. Add the "systematic" number to the "region sify regional books on a systematic basis. Exa Geography of Canada, 917.7133.

5. Use the numbers 910.2 to 913.4-9 for indicated by Dewey. Example: Sectional Regional numbers may be add

OPEN NUM
GEOGR
910.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32

910
GENERAL
DESCRIPTIVE
GEOGRAPHY
910.1
010
BIBLIOGRAPHY
910.101
BIBLIOGRAPHICAL GEOGRAPHY
100
PHILOSOPHY
910.11
PHILOSOPHICAL GEOGRAPHY
220
RELIGION-BIBLE
910.122
BIBLICAL GEOGRAPHY
300
SOCIOLOGY
910.13
SOCIAL GEOGRAPHY
312
POPULATION
910.1312
DEMOGRAPHIC GEOGRAPHY
320
POLITICAL SCIENCE
910.132
POLITICAL GEOGRAPHY
330
ECONOMICS
910.133
ECONOMIC GEOGRAPHY
333
CONSERVATION
910.1333
CONSERVATIONAL GEOGRAPHY
355
MILITARY SCIENCE
910.1355
MILITARY GEOGRAPHY
380
COMMERCE
910.138
COMMERCIAL GEOGRAPHY
510
MATHEMATIC
910.151
MATHEMATICAL GEOGRAPHY
Amer. Geog. Society: CURRENT GEOGRAPHICAL PUBLICATIONS
Hartshorne: THE NATURE OF GEOGRAPHY
Kent BIBLICAL GEOGRAPHY AND HISTORY
Huntington: ENVIRONMENTAL BASIS OF SOCIAL GEOGRAPHY
Atwood: THE GROWTH OF NATIONS
Boggs: INTERNATIONAL BOUNDARIES
Whitbeck and Finch: ECONOMIC GEOGRAPHY
Leith: WORLD MINERALS AND WORLD POLICES
Johnson: MILITARY GEOGRAPHY
Von Cleef: TRADE CENTERS AND TRADE ROUTES
Gilbert: LESSONS IN MATHEMATICAL GEOGRAPHY
Eur. 914
Asia 915
Afr. 916
N.A. 917
S.A. 918
O.P. 919
913.771-Foster: ARCHEOLOGICAL HISTORY OF OHIO
918.801-Berliner: BIBLIOGRAPHY OF LATIN AMERICA
918.6922-Graves: PALESTINE, THE LAND OF THREE FAITHS
918.8-Jones: LATIN AMERICA
918.912-Keasing: NATIVE PEOPLES OF THE PACIFIC
914.4352-Whittlesey: GERMAN STRATEGY OF WORLD CONQUEST
917.7135-Morrison: ECONOMIC GEOGRAPHY OF CANADA
917.7343-Perkins & Whitaker: OUR NATURAL RES. & THEIR CONSERV.
917.73355-Van Valkenburg et al: AMERICA AT WAR-A Geographic Analysis
917.7139-Cornish: GEOGRAPHY OF COMMERCE FOR CANADIANS
917.7335-Fenneman: PHYSIOGRAPHY OF EASTERN UNITED STATES
917.7335-Visher: RAINFALL CONDITIONS
914.37-Taylor: ENVIRONM
THE U.S., A PED-GEOG SURVEY
910
GENERAL
DESCRIPTIVE
OGRAPHY
ng: ELEMENTS OF GEOGRAPHY
RE TO CLASSIFICATION
ber for geography, for descriptive works in geography
eatises not specifically or readily assignable to 910.1 or
dicated on this chart. Example: Reference indicated above,
generic number before the number of the cognate science to
f geography is related. Example: Sectional reference 7,
910.1 (geography), 33 (economics) - zero may be omitted.
y nomenclature for continents, countries, states, and other
regional" classification. Example: Sectional reference 7,
ia, 917.71; 917 (North America), 71 (Canada).
ber to the "regional" number when it is desired to subclas-
matic basis. Example: Sectional reference 7, Economic
7133.
to 913.4-9 for geography sectional material as now
ample: Sectional reference 27, Travelogues, 910.8.
ers may be added wherever practicable
N NUMBER IN
EOGRAPHY
910.1
3.4-9
ES, ARCH.
COUNTRIES
Y
ubbock:
HISTORIC
TIMES

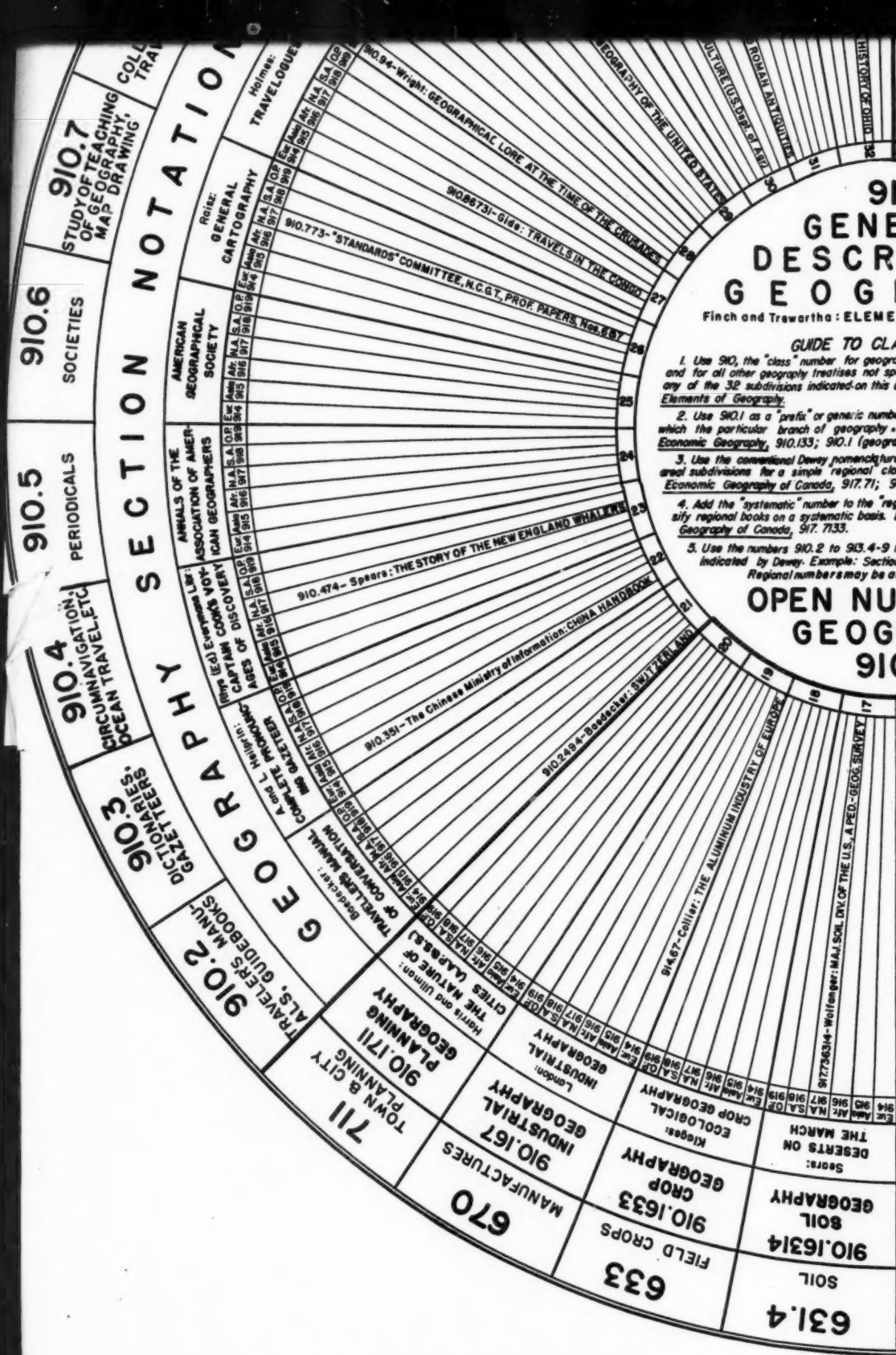
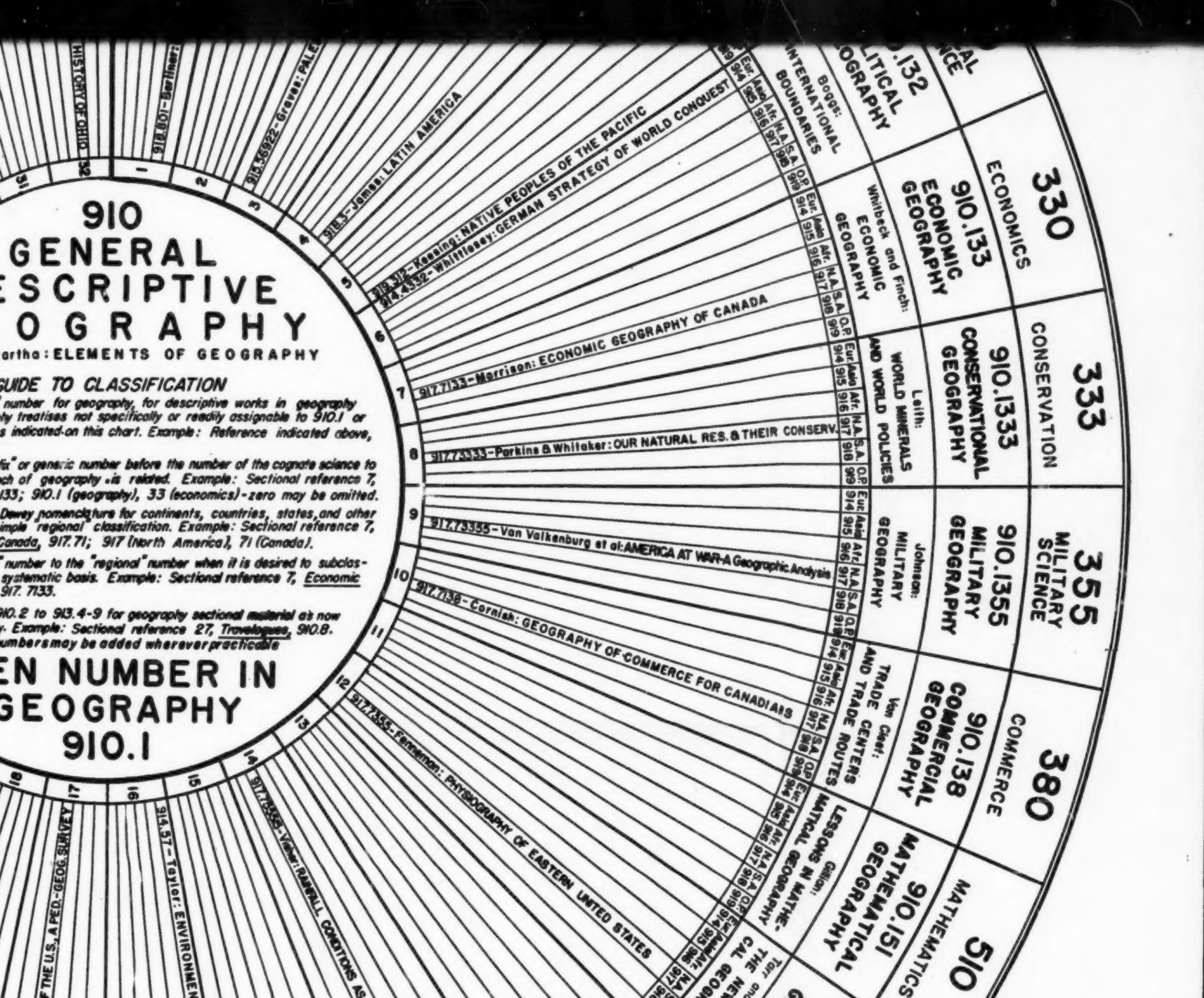


FIG. 3. The solution of Dewey geographic
view the nature of the subject matter of moder
fields of knowledge, and the nomenclature prop
classification of all works in geography.



y geographic classification. This wheel chart exhibits in one ter of modern geography, the relation of geography to other nclature proposed to adapt the Dewey decimal system to the raphy.

CLASSIFICATION AS BASED UPON THE GEOGRAPHIC QUALITY OF A BOOK

Once it is decided the book is primarily geographic, it will not be too difficult, as we shall point out below, to classify it reasonably satisfactorily. And so a somewhat arbitrary fourfold classification of geographic quality of books has been set up to help librarians understand our problems and prospective solutions. We have indicated the four types on the chart by the letters A, B, C, D. (*See* innermost circle on Fig. 2.)

An "A" class book is one that technically should offer no problem at all under the Dewey system as constituted at present. Here belong the items now classified under the division and decimal call numbers 910 and 910.2 to 919 inclusive. (*See* Figs. 1 and 3.)

An "A" class book is one which deals with the nature of geography itself, or with a description and interpretation of regions. In this category belongs the familiar introductory college textbook in geography—"Elements" or "Principles" (No. 18). Here also belong regional texts on continents and countries (No. 26). These books are characteristically edited and authored by professional geographers. Their titles are almost invariably of a geographic character. Their contents are typically geographic throughout.

If, then, an "A" class book is misclassified and misshelved, it is not the fault of Dewey but the classifier who may think that geography is out of its field when it speaks of people—the province of the sociologist—or refers to places which are also referred to in history.

Wrestling with the "B" class book is another matter. We might call it the chief problem-child of geographic classification. Such a book, to start with, has typically a qualifying geographic title, such as Social Geography, Economic Geography, Commercial Geography, Historical Geography, Political Geography, Physical Geography, and Military Geography. As shown in Figure 2, most books in these categories land on non-geographic shelves—Nos. 4, 11, 23.

Referring to the Relative Index of Dewey, we see that the D.C. system does not recognize these subdivisions as a part of Geography, or does so only vaguely. For example, geography books in economic, commercial or industrial geography are assigned the call number for Commerce (380). Political Geography (910) is not specific, duplicating the classification number now used for Geography in general. Military Geography and Physical Geography have non-geographic classifications, (355) and (551) respectively.

To revise the system for these sections of geography books, it will be necessary first of all to clarify the position of geography in relation to the other social and natural sciences. This relationship is illustrated in the form of a wheel index chart (Fig. 3). The outer circle shows the subjects to which the geography branches in the circle adjacent are circumferentially related.

After seeing clearly this cognate relationship it becomes necessary to assign a new set of call numbers for the newly recognized branches of geography which are in harmony with the general pattern of Dewey nomenclature. A survey of the Dewey

Classification Guide reveals that 910.1 is the only classification unit which is now generically unassigned (Fig. 1).

Several of the librarians responding to our questionnaire suggested the possibility of expanding this "unassigned" call number to take care of new subclasses of geography subjects. Thus, one of them observes: "In the present Dewey system, some classes such as Economics (330) have a number provided for its relations to other subjects, as 330.196—Technocracy. Similarly, 910.1 has so far been left blank. For the special library or the University library catering to a strong Geography department this expansion could be made as minute as desired."[6]

Significantly, S. Whittemore Boggs and his Association of American Geographers committee on geographic classification in 1937 pointed to a similar solution: "So far as notation is concerned the Dewey classification is not adapted to the making of geographical subject subdivisions which would be as short and convenient as those employed for geology, but presumably an adequate subject classification could be introduced, chiefly in 910.1."[7]

For the various branches of geography, we may then simply prefix 910.1 to the call number now assigned to the non-geography subject to which it is related, as shown in Figure 3. Thus 010 is the call number for Bibliography. The call number for the bibliography of geographic works then would be 910.1010. For convenience, the zero at the end may conventionally be omitted, thus abbreviating the call number to 910.101.[8]

The same principle would apply for each subject section illustrated on the chart. Economic Geography books now generally put in Economics or Commerce would be put in Geography under 910.133 (*see* chart). A similar reclassification would be made of the other cognate or co-related subjects as indicated for 18 other cognate subject relationships on the chart—Philosophical Geography (910.11), Biblical Geography (910.122), Social Geography (910.13), Demographic Geography (910.-1312), Political Geography (910.132), Conservational Geography (910.1333), Military Geography (910.1355), Commercial Geography (910.138), Mathematical Geography (910.151), Physical Geography (910.155), Oceanography (910.155146), Climatography (910.15515), Plant-Animal Geography (910.157), Anthropogeography (910.1572), Soil Geography (910.16314), Crop Geography (910.1633), In-

[6] This suggestion was made by Nancy Atkinson, Cataloger of the Library at the University of Idaho.

Mrs. Katherine Bowden, cataloger of the library at Valparaiso University, made a similar suggestion to the writer independently of the above observation, while he was considering this geographic classification problem in his class in Geographic Problems.

[7] Boggs, S. Whittemore, *op. cit.*

[8] The author is well aware that Bibliography is not a "division" or a "section" classification unit, but one of the major "classes" of knowledge in the Dewey system. As such, there would be no separate section of bibliography for geography publications in the general library any more than for any other field. The only reason, then, for including it here in the classification circle is for classifying such works in private or departmental geography libraries.

dustrial Geography (910.167), Town and City Planning—whenever geographic (910.1711).

This listing may suggest to the reader other "cognate" categories not indicated on the chart, but the enumeration given here is considered sufficiently comprehensive to cover the major needs of the average library. At any rate, the principle is adaptable to such expansion as is needed.

The "C" book constitutes a third class, where the overlap in authorship and subject matter between geography and cognate subjects is so general that the *local use* of the book may be considered the most potent factor in classifying and shelving it. Thus a book in Physical Geography may equally concern the geologist and the geographer. Where there is no geography department, the present Dewey classification (551) is certainly a logical arrangement. On the other hand, where there is no geology department, it would be scientifically correct to put it in 910.1551 in accordance with the above principle. At present, *all* 44 libraries which reported classification on Tarr and Von Engeln's *Physical Geography* (No. 44 in Fig. 2) have assigned this book to Geology, and none to Geography. Where both departments exist, an adjustment can readily be made. If the book emphasizes the historic or dynamic aspect of earth's surface features, it might properly be assigned to 551; on the other hand, if the book is primarily a description of landforms, it might more logically be placed in 910.1551.

Books on conservation seem to fall into the "C" category. Here again a geographic or non-geographic classification might be decided chiefly on the basis of "practical utility and economy," the avowed keynote of the system, and whether the authorship and motif of the book are chiefly geographic or something else.

The fourth class, the "D" class of book, is not basically geography but contains sideline references to geographic factors or environmental influences, suggested by such a book as Donnelly's *Rocky Mountain Politics* (No. 13, Fig. 2). No geographic claim can be made for a book of this kind, though two libraries out of thirty-one have classified it with Geography.[9]

The classification criteria set forth above will take care of classifying general works in geography where the emphasis is on the "principles" of geography. Examples of references to illustrate the various classification categories of this type are indicated in the fourth circle (example: *Economic Geography* by Whitbeck and Finch).

[9] The following passage is one of the numerous illustrations of this feature of the book: "Politics in Idaho cannot be separated from their geographic setting, for much of the explanation of present-day politics lies in the shape, topography, and climate of the state" (pp. 150–151). The author, a political scientist, then goes on to show how these geographic features bring about disunity in the political program of Idaho, a matter of concern both to the geographer and to the political scientist. For the geographer's own private library this book would logically be codified under 910.132.

A REGIONAL BASE FOR GEOGRAPHIC CLASSIFICATION

But the nature of geography is inherently "regional." Any geography classification scheme should therefore provide for a regional as well as a systematic base. The Dewey system is quite satisfactory in this respect, with its notations of 914 to 919 for the continental areas (Fig. 1), and notations for countries and subdivisions as indicated in the section on History. Thus a work on the general geography of Canada would be assigned the call number 917.71 (917 for North America and 71 for Canada).

There need be no modification of this regional scheme. However, now that it is proposed to recognize generic "subject" divisions of geography—social, economic, etc.—some librarians, general or departmental, or individual geographers, might wish to classify regional references on the basis of the generic subject matter. Thus, for a book stressing the economic phase of the geography of Canada, we may add the subject numeral for economics (330) to the regional numeral 917.73. The Dewey call number for Morrison's *Economic Geography of Canada,* for example (*see* reference No. 7 on Fig. 3), would become 917.7333.

The inconvenience of assigning the longer number may be offset by added convenience in finding together such materials which deal with both the systematic and regional aspects of geography. But whether so used or not, the entries on the wheel chart are so arranged as to enable one to see at a glance the entire field of geography in its dual character as a systematic and regional science.

By adding the now-recognized Dewey geography sections 910.2–913.4–9 to complete the classification circle, the wheel chart thus becomes a convenient device by which virtually all geographic material can be sectionally oriented and logically classified, systematically and regionally.

Grateful acknowledgment is due the Lake Placid Club Education Foundation (D. B. Colburn, Secretary) for granting permission to reproduce Dewey classification material basic to the development of this project.

REVIEWS AND ABSTRACTS OF STUDIES

FISHERIES OF THE NORTH AMERICAN WEST COAST

Bartz, Fritz: "Fischgründe und Fischereiwirtschaft an der Westküste Nordamerikas" (Fishing Grounds and Fishing Economy on the West Coast of North America). 175 pp., ill.; *Schriften des Geographischen Instituts der Universität Kiel,* Band 12, 1942.

Fritz Bartz collected the material for this study during a sojourn on the Pacific coast that lasted slightly more than three years, 1936 to 1939. The impressions he gathered by personal observation along the stretch of coast from Alaska to Lower California, all of which he visited in the motley company of the fishermen that garner the harvest of the eastern North Pacific, may be recognized on almost every page. He has arrayed these personal observations against a background drawn from printed material that is scattered and often accessible only with difficulty. The reader notes with regret his prefatory explanation that the historical account of the western fisheries here published is severely abridged. One would like to see a full report on the historical information he gathered. The writing and publication of Bartz's work was delayed by the war, and its distribution in America has been still further delayed; but the changes in the past ten years (the latest statistics cited are from 1937) can be easily supplied.

Somewhat more than two-thirds of the book is devoted to the fisheries as they existed in the late thirties of this century. This exposition rests upon a broadly based discussion of the physical qualities of the region in which the fishing is carried on, the fishes that are caught commercially, and the development from aboriginal practices through the rapid changes in commercial exploitation that occurred in the second half of the nineteenth century. Bartz's account of the modern industry contains an exposition of the technical and economic aspects of catching various groups of fishes (salmon, halibut, tuna, sardines, mackerel, herring, cod); the rôle of the fisheries in the establishment and maintenance of settlements; the ethnic groups engaged in fishing; the place of the fisheries in the economy of the several parts of the Pacific coast of North America; and the differences between the west-coast fisheries and those of other parts of the earth.

Such a transcription of a table of contents inevitably evokes the image of a dry and lifeless product of the study. It is therefore necessary to emphasize the freshness and immediacy of Bartz's presentation. He shares with the reader the sights, sounds, smells, and strenuous labors of the fisherman's life, from the mud flats exposed at low tide in Bristol Bay to the sparkling tropical waters from which tuna are hauled on deck with stubby poles and short, stout lines. It is usually the fisherman's view that he defends when he discusses the conflicts that arise among the many groups involved in the fisheries.

An enlightening perspective that Bartz brings to his discussion is that of an observer from the west-European fishing area, within which most of the marine harvest is consumed locally. By contrast, western North America is an area from which the larger fraction of the fish caught is exported, to interior and eastern North America and more remote parts of the earth. The canning of salmon and tuna for distant markets is the feature of the west-coast fisheries that from this comparative viewpoint attracts most attention. Bartz notes, too, the difference in tastes between European and American consumers of fish; a difference, for example, that on the Pacific coast of North America consigns sardines and herring, highly esteemed as food fishes in Europe, to use as fish oil in industry and as fertilizer. The American reader has good reason to thank Bartz for such unhackneyed insights, as well as for his sound general survey of the fisheries in our Pacific back yard.

JOHN LEIGHLY
University of California

CURRENT DEVELOPMENTS IN SWEDEN'S INDUSTRIES

Nelson, Helge: "Indalsälven, Sveriges Mest Utnuttjade Kraftkälla" (Indals River System, Sweden's Greatest Source of Water Power), and Grundström, Sven: "Norrbottens Järnverk—En Storindustri Under Utbyggnad" (The Iron Works of Norbotten (NJA) at Lulea—A Great Industry Under Development), *Svensk Geografisk Arsbok*, Arg. 22, 1946.

The potentialities of water power in Sweden have long been well known. Recent progress in harnessing this source of energy is perhaps less familiar to Americans. Dr. Nelson notes this growth briefly and presents in detail the story of the utilization of the waters in the Indals River basin (Indälsalven) with some emphasis upon the rôle of the numerous lakes in the river course itself. These lakes are readily controlled to provide constancy of flow of water at the several power stations.

Indalsälven is located in the province of Jämtland in that general area of northern Sweden known as Norrland. Of the fourteen largest power stations in Sweden, eight are along this river system and these yield half the total water power generated. Even so, only 67 per cent of the entire fall of water in the stream course between Storsjön Lake and the Gulf of Bothnia is as yet utilized. The development of these power stations has been rapid: the percentage of the power requirements of central and southern Sweden derived from falling water rose from 12 per cent in 1938 to 35 per cent in 1945.

In consequence of the damming of the waters, there are times when the river bed is entirely exposed to view. This has facilitated the study of river erosion in rather hard rock (leptite). Gullying and pot-hole effects are especially noteworthy.

Professor Nelson notes significantly that the erection of the power stations has not attracted important urban settlement even though the distribution of the electrical energy has played a critical rôle in the economic life of the peoples of the continuous hinterland and of more remote areas.

The paper on the iron works of Norrbotten is of particular interest because it directs attention to a quiet revolution which is changing an old economic-geographic principle of long standing. We have generally proclaimed that iron ore is shipped to the region of coal and limestone because the bulk of the ore per unit of manufactured product is less than the combined quantities of the latter two raw materials. There has been at least one outstanding exception to this principle in the United States in the case of a small steel plant at Gary, Minnesota. The U.S.S.R. has developed a much more significant exception in its Magnitigorsk works; and now Sweden is following suit with further exceptions but for reasons different from those underlying the cases just mentioned.

Grundström points out the change occurring in the Norrbotten region. He states that "three factors have lately made the iron works less dependent on coal, namely, the diminished consumption of coal per ton of iron ore in modern coke blast furnaces, the use of electricity (wholly or partially) instead of coal for the heating of blast furnaces, and an improved technique in the transport of coal." Furthermore, "experiments are being made at NJA to produce steel directly out of ore by the so-called sponge-iron process, in which the production of pig-iron requiring coal will be superfluous."

The development of water power in Norrbotten is going on apace and bids fair to add enormously to the industrial capacity of Sweden. The nation is looking ahead with reference to the utilization of its reserves of iron ore estimated at some 2,000 millions of tons, and, more immediately, to its needs by 1950. The latter plans call for an increase in the number of electrical blast and coke furnaces, and electrical steel furnaces and rolling-mills, both coarse and fine, also operated with electrical power derived from numerous water falls in Norrbotten. The needs for rolled and wrought iron and steel for all purposes by 1950 are calculated to exceed the consumption in 1942 by approximately fifty per cent.

Both papers are effectively illustrated with maps, photographs, and diagrams and each is concluded with a short summary in English. The several photographs accompanying Grundström's paper convey some conception of the size of the NJA plant, the largest in Sweden, whose further enlargement is now under way.

EUGENE VAN CLEEF
The Ohio State University

BIOGRAPHY OF THE RUSSIAN GEOGRAPHICAL SOCIETY

Berg, L. S.: *One Hundred Years of the All-Union Geographical Society (1845–1945)*. Academy of Science of the USSR, Moscow-Leningrad, 1946.

The Russian Geographical Society is the fourth oldest among the large geographical societies of the world. First in origin is the Geographical Society of Paris, established in 1821. Next are the Geographical Society of Berlin and the Geographical Society of London, established in 1828 and 1930, respectively. Fifth place belongs to the American Geographical Society of New York, founded in 1852. The first general meeting of the Russian Geographical Society took place on October 19, 1845.

The history of the Russian Geographical Society during the first fifty years of its life was described by one of the most prominent members of the Society, P. F. Semenev-Tyan-Shanskiy in a three-volume monograph, published by the Society in 1896. The present book does not pretend to be a complete history. The author, who is one of the oldest members of the Society (elected in 1904 but associated with it since 1898, its president since 1940), devotes a large part of his book to biographical sketches of the more prominent members whom he either knew personally or with whose works he is intimately acquainted. His purpose was, however, not only to describe the "course of events" but also "to present in a popular form the scientific contributions of our great geographers."

The earliest scientific geographical investigations in Russia were undertaken during the reign of Peter the Great, although a great deal of valuable geographical information was accumulated during several centuries before Peter's time. A short introductory chapter in Berg's book presents a very brief sketch of this, so to say, pre-historic period.

The beginning of the Russian Geographical Society is intimately connected with the names of Admirals Litke and Wrangel, Professor Arsen'yev, academitian Ber, ethnographer Dal', Middendorf, and others. Altogether there were 17 charter members. The first president of the new Society was Grand Duke Konstantin Nikolayevich, the well-educated, liberal second son of Tsar Nikolay I, whose tutor happened to be Litke himself. The first expedition of the Society was organized in 1847 for the purpose of "exploration of the boundary between Europe and Asia throughout the Northern Ural."

The purposes of the Geographical Society as stated in the 1849 revision of its By-laws are "to collect, study, and disseminate in Russia geographical, ethnographical and statistical data in general and especially those pertinent to Russia itself, as well as to distribute reliable information about Russia in other countries." The Society was divided into four sections,—mathematical geography, physical geography, ethnography, and statistics.

The subject matter of geography was redefined by the Society several times. In 1887 Petri, the first professor of geography in the University of St. Petersburg, reported to the Society on "the problems of Scientific Geography," stating that "the problem of geography is to elucidate (to understand) the essence and the life of the earth. Geography obtains its data from a series of natural, historical, economical, and philosophical sciences; its own duty is to correlate these data for the purpose of a comprehensive characterization of the earth."

Later, the author (Berg, L. S., "The Subject and Problems of Geography," *Bull. Geogr. Soc., LI*, 1915, 463–75) defined geography as "the science dealing with the geographical landscapes." According to Berg, the geographical landscape or "aspect" is "such a combination of objects and phenomena in which peculiarities of relief, climate, water resources, vegetation, soils, animal life, as well as population and its industries, are merged into a single harmonious system occupying a certain zone of the earth." Geomorphology, Hydrology, and Climatology, which are usually referred to as branches of Physical Geography, are rather independent disciplines.

The Geographical Society was active in the dissemination of geographical facts. It published a large quantity of instructions and programs for collecting data on physical geography, ethnography, and linguistics, as well as instructions for barometric leveling, and surveys of earthquakes, lakes, rivers, coasts, glaciation, ground frost, shifting sand, clouds, folklore, regional customs and local dialects.

The Society established a number of regional divisions including the East-Siberian with headquarters at Irkutsk; Caucasian at Tbilisi; Orenburg; Southwestern at Kiev; West-Si-

berian at Omsk; Altai at Barnaul; Turkestan at Tashkent, and Yakatsk at Yakutsk. Other divisions were established at Krasnoyarsk, Vilno, Semipalatinsk, Khabarovsk, Chita, Vladivostok, Nikol'sk-Ussuriysk, and more recently at Chelyabinsk, Ashkhabad, Arkhangel'sk, Oyirot-Tura, Saratov, Petropavlovsk-on-Kamchatka, Erivan', Simferopol' in Crimea, and Petrozavadsk in the Karelo-Finnish Republic.

The Society's library consists of more than 200,000 volumes including many rare books, maps, and manuscripts. The society publishes several periodicals, of which the Bulletin series is about 80 years old, and also maintains committees on geomorphology, phenology, hydrology, air-photography, and water resources and forestry.

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